DOCUMENT RESUME

ED 094 757 IR 000 957

TITLE	Northeast Academic Science Information Center (NASIC), Phase I Report (March 1973-February 1974). Volume 4.
INSTITUTION	New England Board of Higher Education, Wellesley, Mass. Northeast Academic Science Information Center.
SPONS AGENCY	National Science Foundation, Washington, D.C. Office of Science Information Services.
PUB DATE	May 74
NOTE	205p.; For related documents see IR 000 954-956
EDRS PRICE	MF-$0.75 HC-$10.20 PLUS POSTAGE
DESCRIPTORS	Annual Reports; *Computer Oriented Programs; Demonstration Programs; *Information Centers; Information Retrieval; Information Systems; *Marketing; Program Descriptions; *Regional Programs; Surveys; Time Sharing; *University Libraries
IDENTIFIERS	Boston; NASIC; *Northeast Academic Science Information Center

ABSTRACT

In this fourth volume of a four-volume report on the activities of the Northeast Academic Science Information Center (NASIC), two studies are reported. The first was a study of the feasibility of marketing bibliographic and census data base products and services via NASIC. It represented an attempt to build a profile of the potential market for such services in the academic community, in state and local governments, in nonprofit institutions, and in the commercial and industrial area. The second study was a survey of 15 companies in the Boston area which provide access to timesharing computers. Special emphasis was placed on evaluating the ability of these companies to support text management and information retrieval from large data bases. (JY)

ED 094757

NORTHEAST ACADEMIC SCIENCE INFORMATION CENTER (NASIC)

PHASE I REPORT

(March 1973 - February 1974)

VOLUME 4

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

IR 000 957

Submitted in lieu of the 4th Quarterly Progress Report to the Office of Science Information Service, National Science Foundation by the New England Board of Higher Education, Wellesley, Massachusetts, under Grant No. GN-37296, May 1974.

TABLE OF CONTENTS

APPENDIX E -- Survey Questionnaires and Reports on Centers Visited, September - December 1973.

APPENDIX F -- NASIC Bibliography, March 1974.

APPENDIX G -- NASIC -- A Regional Experiment in the Brokerage of Information Services - David M. Wax and R.D. Morrison, Jr., October 1973.

APPENDIX H -- Some Comments on the Present and Future Role of NASIC - Alan M. Rees, November 1973.

Survey Questionnaires

and

Reports on Centers Visited

September - December 1973

New England Board of Higher Education
Wellesley, Massachusetts

An important component of the first year of NASIC development activity involved a survey of existing bibliographic information centers and information processing activities across the country. A joint effort of the New England Board of Higher Education, the Office of University Library Management Studies of the Association of Research Libraries and the Electronic Systems Laboratory of MIT, the aim of the survey was to obtain information relating to the following tasks described in the original NASIC Proposal:

Task I-8 Identify and Describe Alternate Organizational Approaches for the Providing of Machine-Readable Data Base Services

Task I-9 Study the Usage of Machine-Readable Data Bases in the Academic Research Environment

Task I-10 Determine the Institutional Commitments, Decision Making Processes, Policies and Planning for Use of Machine-Readable Services on Campus

Task I-11 Evaluate Economic and Management Factors

Jeffrey Gardner of ARL, Alan Benenfeld of MIT/ESL and David Wax and R. D. Morrison of NEBHE developed two questionnaires which served as guidelines for obtaining information during the site visits. The first of these instruments concerned the history and development of the center, its organization and management, the level and nature of utilization of the center's services, the sources and amount of economic support for the center, and the scope of center activities. This questionnaire was utilized as a basis for discussions with university administrators, library directors, and information center directors and staff.

The second survey instrument was directed toward campus-based users of the centers visited. Along with the other questionnaire, it emphasized information relating to the role of the library in providing assistance to the user, to service promotion and marketing, and to alternatives for cost recovery. The two questionnaires constitute the final section of this Appendix.

Each of the institutions was visited by at least two of the staff persons involved in the survey effort, with David Wax participating in each site visit to assure continuity. The one- or two-day stay at each center was scheduled by the center administration and allowed for individual and group interviews with all appropriate parties.

The centers and institutions surveyed, along with the dates of the site visits are listed below:

Georgia Information Dissemination Center (GIDC), University of Georgia, Athens, Georgia, September 18-19, 1973

New England Research Application Center (NERAC), Storrs, Connecticut, October 4

Social Science Data Center, University of Connecticut, Storrs, Connecticut, October 5

Illinois Institute of Technology Research Institute (IITRI), Chicago, Illinois, October 18-19

Campus Based Information System (CBIS) and Knowledge Availability Systems Center (KASC), University of Pittsburgh, Pittsburgh, Pennsylvania, October 30-31

Mechanized Information Center (MIC), The Ohio State University, Columbus, Ohio, November 1-2

Stanford University Libraries, Stanford University, Stanford, California, November 26-27

Institute of Library Research, University of California,
Berkeley, California, November 28

Center for Information Services (CIS), University of California,
Los Angeles, California, November 28-29

University of Florida Libraries, University of Florida,
Gainesville, Florida, December 12-13

North Carolina Science and Technology Research Center (NC/STRC),
Research Triangle Park, North Carolina, December 14.

Each visit is summarized in a report (the two centers at the University of Pittsburgh are included in a single report, as is the case for the two campuses of the University of California), and each report has been reviewed for accuracy by the staff of the center visited. The reports are presented in this Appendix in the order in which the centers were visited.

These survey reports will form the groundwork for a series of papers to be prepared by the NASIC and ARL staffs for publication during Phase 2 of NASIC development. It is hoped that these reports, and the papers that will result from them, will enable other interested persons and particularly university library administrators to benefit from the information obtained through this survey activity.

SUMMARY REPORT OF

A NASIC SURVEY OF MACHINE-READABLE DATA BASES

Their Administration, Services and Uses on University Campuses

I. General Information

A. Institution Surveyed:

The University of Georgia

Athens, Georgia 30602

B. Resident Information System/Center Name:

Georgia Information Dissemination Center (GIDC)

C. Dates of Survey: September 18 and 19, 1973

NASIC is supported by the National Science Foundation under Grant No. GN-37296 and is a Research Program of NSF's Office of Science Information Service.

II Historical Background

The Georgia Information Dissemination Center (GIDC) is one of several university-based centers for which the Office of Science Information Service (OSIS) of the National Science Foundation has provided developmental support during the past few years. The development of the GIDC evolved from the interest and early efforts of a former Director of the University's Office of General Research (OGR), who was intrigued with the potential use and value of the CBAC tapes at this university. He was instrumental in an OGR decision to provide direction and financial support for the development of a search services capability within the Computer Center in 1968. This activity was financed for a year out of university general funds and the cost was approximately $100,000.

The user enthusiasm generated during the first year of operation provided internal justification for further development of the services. But the experience gathered during this first year of operation with five data bases suggested that the then publicly available rudimentary software in use was severely limiting the effectiveness of the service and the capacity to accommodate an increasing volume of users. Consequently, Foundation support was solicited in 1969 to support expansion of the center.

NSF Grant No. GN-851, which was awarded in October 1969, supported the development of a generalized bibliographic text retrieval system suitable for multiple data bases, the implementation of several new data bases and the expansion of the center facilities to serve the faculty, research staff and graduate students in the University System of Georgia through the provision of both SDI and retrospective search services.

The University also contributed substantially (estimated at $80,000 - 100,000 per year) to the GIDC development program.

The dominant roles in the planning activities leading to a University decision to implement the expanded machine readable services were shared by:

1. A former Director of the OGR, who identified the apparent need for the information services and cooperated with the Computer Center director in the determination and definition of the objectives of the development program, developed the justification for the program, and participated in the initial data base selection process;

2. The present Director of the Office of Computing Activities who, in addition to the above pre-grant activities, administered the development program and served as the Principal Investigator; and

3. The Head of the Division of Information Services who was responsible for preparation of the proposal to the NSF and provided much of the technical direction throughout the funded development effort.

Although GIDC services are perceived by several University administrators as an extension of traditional library services, the library administration was not at all involved in the initial planning of GIDC and has not been an active participant during the funded expansion of the center's capability to provide bibliographic search services.

The pre-grant development which eventually led to the GIDC began in June 1968 with the formation of the University of Georgia information science group. This group undertook the technical activities associated with the collection of available bibliographic data bases and software packages and the initiation of services for the Athens campus. Services have been available since July 1968, free to University System users and on a cost recovery basis to others.

The GIDC processing system has been designed to support large volume search operations in a batch mode. On-line data entry is provided as a means for the development of search strategies.

III Management and Organization

Since the advent of GIDC, the Office of Computing Activities (formerly the Computer Center) has assumed a major responsibility for policy decisions relating to the provision of GIDC services. No policy making body or policy advisory organization exists, and consequently Dr. Carmon, Director of the Office of Computing Activities, not only formulates and administers policy but is also the final decision authority below the level of the Provost of the University. (The organizational relationship of GIDC to the University and to the University System of Georgia is illustrated in Figure 1.)

The administrative and management roles associated with the GIDC operation are shared primarily by the Director of the Office of Computing Activities, the Head of the Division of Information Services and the Head of the Department of Literature Services. Dr. Carmon is primarily responsible for overall center and related research administration. Ms. M.K. Park, Head of the Division of Information Services, is primarily responsible for the technical direction of the information services operations and related software developments, including planning for new services. She also participates in administrative decisions on GIDC operations. Dr. John S. Edwards, Head of the Department of Literature Services, is primarily responsible for the bibliographic information processing operations, including data base selection and service promotion activities.

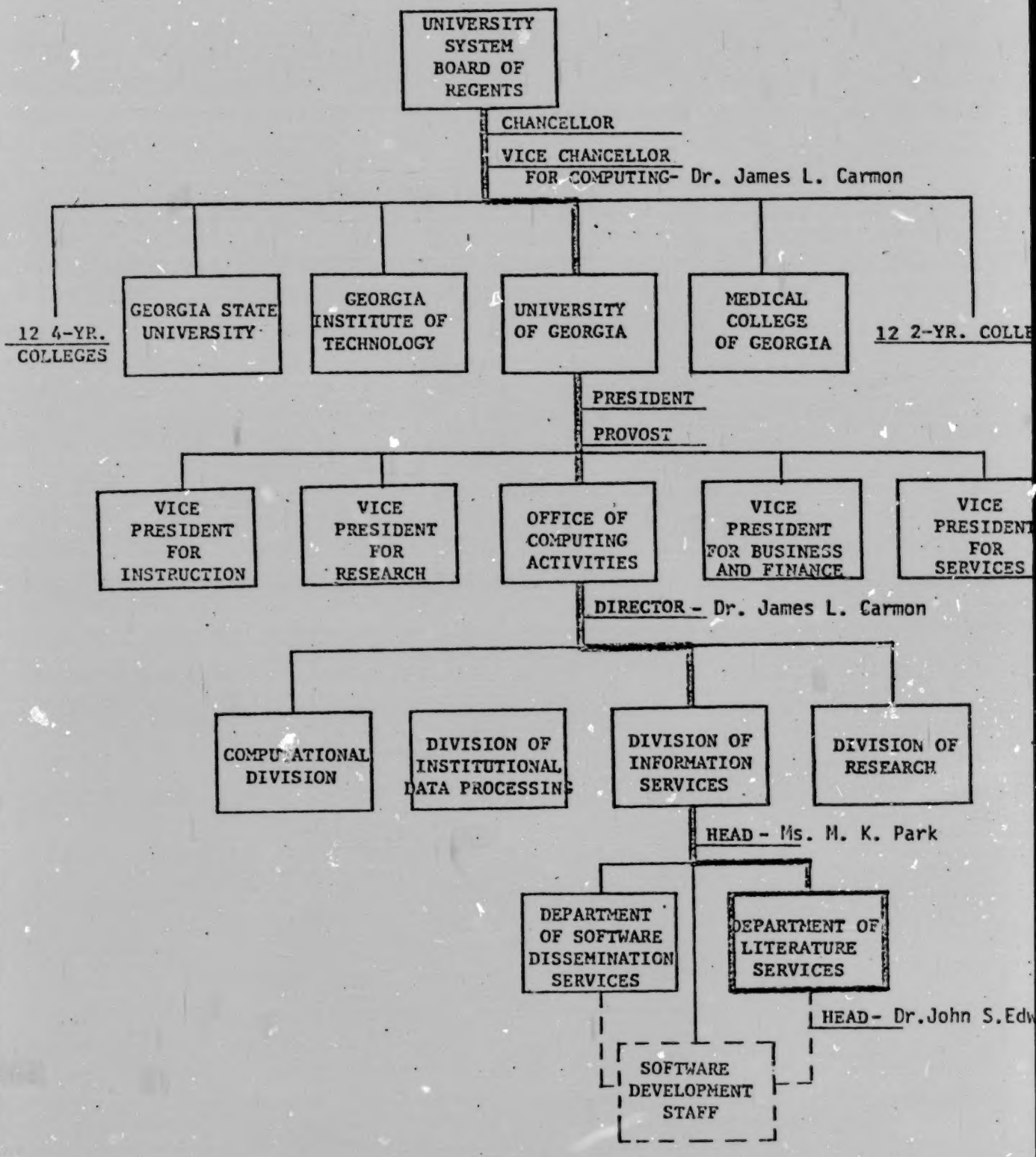

Figure 1. Organizational Relationship of the Department of Literature Services within the University of Georgia and the University System of Georgia

The bulk of GIDC operational costs are paid by the University through general administrative budgets for the Office of Computing Activities. Usage charges for non-University System of Georgia users contribute about 3-6% of the annual operational costs. The Office of General Research continues to provide partial support for GIDC as an investment toward obtaining additional Government funding of research programs at the University.

The Office of Computing Activities employs approximately 200 persons, of which 28 work in the Division of Information Services. The Literature Services Department of that Division has a staff of approximately 10 FTE's which assumes primary operational responsibility for the GIDC information services. This staff includes 4 Information Specialists who prepare profiles, 4 programmers and researchers in the R&D areas who provide approximately 1 FTE for maintenance of the operational systems, 4 clerical and junior programming staff persons who handle the output distribution, royalty reporting, and job setups, and 1 FTE for supervisory and administrative responsibilities.

IV Service Center Operations

A. Services Provided

As of June 1973, GIDC was serving some 1640 users, where users are defined in terms of mailing addresses. Most of these users are located at institutions of higher education in the University System of Georgia, where the Library often serves as the single "user" for an entire campus. Current awareness and retrospective searching are available on the 19 data bases listed below.

Bibliography of North American Geology (Retro only)

Biological Abstracts

BioResearch Index

CA-Condensates

Cataloging and Indexing (CAIN)

*Chemical-Biological Activities (Retro only)

*Chemical Titles (Retro only)

Current Information Tapes for Engineers (Retro only)

Compendex

Current Index to Journals in Education

Geophysical Abstracts (Retro only)

Geological Reference File

Government Report Announcements

Nuclear Science Abstracts

Psychological Abstracts

Research in Education

**Sociological Abstracts (1967-68 Retro only)

***Searchable Physics Information Notices

Toxitapes (experimental)

*GIDC has discounted the provision of current awareness services from the CBAC and Chem Titles data bases due to more in-depth indexing of the CA-Condensates data base covering the same literature.

**GIDC is automating this data base under an agreement with the publisher.

***Searches on SPIN were discontinued at the end of 1973.

Plans for future developments include:

a) continued expansion of the search services,

b) development and evaluation of an experimental information dissemination network,

c) addition of the Pandex, Inspec, and Environmental Science Citation Index data bases for current awareness searching, and,

d) continuation of development work on chemical structure data bases.

B. User Interface

Assistance to users is usually provided through Information Specialists resident at the Athens campus and in Atlanta, or through reference librarians at remote user sites, such as the Georgia Institute of Technology. Since search strategy design and profile preparation are performed in most cases by the Information Specialist, there is no routine training of the end user. An on-line data entry system allows input and maintenance of search profiles from both local and remote sites. Limited profiling assistance is provided to the Information Specialists through the terminal system for interactive edit of the profile and vocabulary expansion support.

C. Search Strategy Design

A user resident at the University of Georgia campus generally receives assistance in a reference interview (usually 45-60 minutes in length) during which data base selection, profile preparation, and profile coding are usually completed. Output review of the initial search results is routine, resulting in profile revisions as necessary. When a large volume of output is expected, the usual practice is to run the profile as a current awareness search (on latest file update tapes) one or more times before scheduling the retrospective search. Profiles can also be submitted in writing and will be reviewed by an Information Specialist prior to input to the system for search. Although each specialist can search all data bases, there is a tendency to specialize by subject discipline and to feed profiles to the subject specialist in the appropriate area. The experience at GIDC suggests that the best results are achieved through intermediaries familiar with both the data base and the discipline, although good results have also been achieved with trained reference librarians.

D. Promotion and Marketing of Services

Very little programmatic emphasis is given to the formal promotion of GIDC services within the University System. With the exception of the library at Georgia Institute of Technology, which pursues increased usage through active promotion, the other libraries in the University System play a minimal role in service marketing. It was suggested that word of mouth passed among satisfied users has resulted in steadily increasing usage levels over the years.

Advertisement outside of the University System and outside the State of Georgia, presenting GIDC as one of several state resources, is viewed as a part of the general promotion of the University System of Georgia.

E. Information Specialist Training

Staff Information Specialists at the Athens campus and in Atlanta have advanced degrees in subject disciplines pertinent to the major data bases searched. This is not necessarily true of the reference librarians who perform the IS functions at remote locations. The formal training program for the specialists and the librarians usually consists of 2 or 3 days on-the-job training or workshop experience in concert with an experienced Information Specialist, followed by approximately a month of profiling with frequent quality control checking by experienced specialists. The Division of Information Services is presently developing an IS training package which will provide for approximately 40 hours of classroom and terminal activities and will be supported by course outlines and instructional text, visual aids and appropriate manuals.

F. Processing Center Activity

Since its initiation, GIDC has processed over 16,000 retrospective searches. There are approximately 4200 unique current awareness profiles

in the system. Data representative of the average number of items retrieved during typical retrospective and current awareness searching activities was not provided.

The twenty data bases presently available for searching constitute just under 5 million document records. The retrospective files have increased during the past four years as follows:

Year	No. of Records	No. of Data Bases	New Records Entered
FY 70	1.8×10^6	7	
FY 71	2.8×12^6	15	1×10^6
FY 72	4.1×10^6	19	1.3×10^6
FY 73	4.9×10^6	19	$.8 \times 10^6$

G. Processing Center Operational Cost

The distribution of GIDC costs for FY 1973 was as follows:

Salaries	26%
Overhead	13%
Benefits	4%
Travel	1%
Data Bases	7%
Supplies	12%
Computer Time	37%

Data indicating dollar amounts of operational costs were not provided.

V Services Usage

Current awareness searches are run on 13 data bases whenever current issue or update tapes are received from the supplier. Frequency of updates vary from weekly to quarterly as shown below:

Frequency of Update	No. of Data Bases
Weekly	1
Semimonthly	3
Monthly	5
Quarterly	4

Search results are usually mailed within two days after receipt of update. Profile preparation and profile updating (unlimited) costs are included in the search costs borne by outside users. Abstracts can be provided on request from 6 of the 13 data bases.

Retrospective searches on the 19 available data bases are scheduled over a two-week processing cycle with the throughput time for obtaining final results normally running two to three weeks. However, search results are mailed as the several segmented data bases are processed throughout this interval. Special demand searching options can be accommodated but at greater cost.

Non-bibliographic data bases are not available as normal GIDC services, but several campus users of census tapes have been accommodated through the processing facilities at Oak Ridge National Laboratories and the University of Florida under cooperative arrangements with GIDC. Some internally funded experimentation is underway with portions of the CAS Registry system and its associated files.

There has been no formal connection between the Office of Computing Activities and the University Library, although some informal working relationships have been established. GIDC does not at present provide any document delivery services; however, the library has reported a 100% increase in 72/73 over 71/72 in demand for photocopies. It is estimated that 75% of this increase can be directly traced to the computer search services. Under

the leadership of the new Director of Libraries, suggestions for cooperative efforts are under discussion in areas of automating the library's technical processing, provision of GIDC services through the campus library, and increased coordination for the purposes of expansion of document delivery capacity.

VI User Community

A profile of the active GIDC user community based on usage statistics compiled through June 1, 1973 is shown below:

Classification of Center Users by Type

Type of User	No. of Users*
University System of Georgia	1255
Commercial Users	104
Academic Institutions	6
Experimental Users	21
Remote Site Users	254
TOTAL:	1640

*"Users" are identified by mailing address, so a single user may be an individual, a research group, or an organization (e.g., an entire college.)

A survey of the University System user community conducted in 1972 indicated that the output obtained from each profile processed was viewed by 3 to 5 individuals; thus, it has been estimated that the actual number of users being served in the University System is in excess of 6,000.

During the survey of the GIDC by NASIC staff members, interviews were held with six users of GIDC services. These people were not aware of any formal mechanism for user participation in the selection of GIDC data bases. However, one user reported that he had made a somewhat formal request to GIDC management to purchase the Index Veterinarius data base. The users also indicated that there had been a concerted

effort to publicize services early in the GIDC development program, but in the recent past service promotion has apparently been reduced to informal word-of-mouth user communication, at least within the University System.

The users interviewed generally expressed satisfaction with the services provided through GIDC, although several reported some minor dissatisfaction resulting from minimal quality control of output and limited routine follow-up efforts by the GIDC staff. This perception seems to be consistent with GIDC's system performance monitoring and operations evaluation which is an informal process with few structured data gathering procedures or mechanisms. Feedback is generally initiated by the user, and those interviewed indicated that they had to initiate refinement of strategy to limit profiles that were too broad and to complain about occasionally unreadable output.

The majority of users interviewed rated the search need as important, that is, necessary to help determine the course of future work or to help fill in gaps in knowledge, but there was also some indication that the two-week processing cycle is not timely enough when a user is urgently in need of information.

The users interviewed indicated that the results of most of their search efforts were of a significant level of importance in terms of changing the course of a research project or providing key information needed to obtain a grant. One user commented that GIDC services provided information not obtainable elsewhere, and such information may have contributed to a change in the direction of his research. Another indicated that the service reduced the time he spent in the library, thus allowing more direct application of effort to his research interest. Another user indicated that a successful joint proposal evolved from use of GIDC search services.

The consensus of the users was that the actual wait time for receipt of complete retrospective search results was frequently in excess of the two weeks reported by the Center. With the few exceptions reported earlier, most of the users were satisfied with the overall relevancy of the search results. Comments as to the timeliness of the material retrieved related more to data base production delays than to GIDC's processing time. One user did indicate, however, that if timeliness was a factor he would utilize other services which, in his opinion, were more up to date.

While there were several suggestions made by users for possible improvements in GIDC services -- e.g., reformatted output to emphasize the citation, an indication of the library's holding of the cited document, a formal system of feedback and quality controls -- the unanimous response of the users indicated that GIDC services are convenient and easy to use. Those interviewed also felt that use of GIDC services had increased or upgraded the quality of their usage of traditional library services. In conjunction with these responses, several of those interviewed stated that their usage would decrease only moderately, if at all, should they be required to pay for GIDC services.

VII Processing System Characteristics

A. Information System Description

The GIDC Text Search System was designed as a generalized free text retrieval system specifically suited for large volume operations on a wide range of bibliographic data bases in a telecommunications-based information dissemination network environment. The heart of the system is the Text Search retrieval module, developed in 1970 to operate on data in SFF, the Standard File Format, first developed at the Chemical

Abstracts Service (CAS). The system is batch-processing oriented, uses sequential magnetic tape files for the data bases, and has an on-line, interactive search profile entry capability. Search queries can be entered from either local or remote terminals and the search results can be transmitted back to the same remote locations for printing. Optionally, search results may be printed at the central processing site, either on attached printers or on off-line printing devices.

B. Hardware Configuration

The searches are processed generally on an IBM 360/65 computer configuration, in a dedicated batch mode on the third shift. An on-line data entry system is resident in low-speed core during the first shift for entry and update of the search profiles. In addition to the use of the 360/65 computer for the searching operation, two IBM 1401 computers are used routinely to print the search results and a CDC 6400 can be pressed into service to handle the printing of extra large output loads.

C. Software

The operating system at the time of the survey was IBM OS, MVT with HASP. HASP is used to facilitate routing of search results to remote printers. The on-line profile input update and management module was also run under OS. An upgrade to the computing facilities is planned in late 1973 with the addition of an IBM 370/158 and implementation of ASP.

The major programs are written in 360 BAL; utility and conversion programs are in PL-1. The software has been transferred to at least two locations with compatible hardware and operating systems with only relatively minor programming modifications. The GIDC Text Search System is available for purchase (documentation price $100.00, program price $4,000).

D. Operational Environment

Searches and conversions are run on a third shift. Data base updates are converted to standard file format on the day of receipt, the original tape serving as back-up. Searches are run the following night and the tape is then concatenated with the previous issue of the data base for retrospective search purposes. Retrospective searches are scheduled over a two-week period. Several data bases are searched in segments and scheduled over several nights in order to distribute the processing load evenly.

VIII Survey Participants

For their several contributions to this survey effort, the NASIC staff extends its appreciation to the following members of the University of Georgia community:

William Pelletier, Provost
James Kenney, Associate Provost
Robert C. Anderson, Vice President for Academic Affairs
Charles Douglas, Director - Office of General Research
James L. Carmon, Director - Office of Computing Activities
Margaret K. Park, Head - Division of Information Services
John S. Edwards, Head - Literature Services Department
John Schuenemeyer, Information Specialist
Warren Boes, Director of Libraries
Joanne Harrar, Assistant Director of Libraries
Carl Franklin, Science Librarian
Arlene B. Ciener, Pharmacy Librarian
Ivan Roth, Faculty - Microbiology Department
James Carver, Faculty/Research Associate - Chemistry Department
William Loughner, Medical Information Specialist, College of Veterinary Medicine

and Charlotte Folk, Librarian - U.S. Environmental Protection Agency, Athens Laboratory

SUMMARY REPORT OF

A NASIC SURVEY OF MACHINE-READABLE DATA BASES

Their Administration, Services and Uses on University Campuses

I. General Information

A. Institution Surveyed:

University of Connecticut

Storrs, Connecticut 06268

B. Resident Information System/Center Name:

New England Research Application Center (NERAC)

C. Dates of Survey: October 4 and 5, 1973

NASIC is supported by the National Science Foundation under Grant No. GN-37296 and is a Research Program of NSF's Office of Science Information Service.

II. Historical Background

The New England Research Application Center (NERAC) is one of several Regional Dissemination Centers established by the Office of Industry Affairs and Technology Utilization, U.S. National Aeronautics and Space Administration. The mission of NERAC, like its sister centers, is to study and effect the transfer of technology. The RDC network was established by NASA as part of the Technology Utilization Program aimed at the dissemination of the large amounts of research information generated by the billions of dollars spent on space and space-related research. Each center operates independently and offers a variety of services to fee-paying industrial, educational and other clients.

The development of NERAC under the sponsorship of the University of Connecticut evolved from the early interest of the Dean of the School of Business Administration in:

1. Creating a broad computing capability for the School of Business Administration, and
2. Affecting statewide awareness and utility of the School's services and resources

Early in 1965, negotiations were initiated between the University and NASA to effect location of an RDC at the University of Connecticut. The expressed early interest of the University of Connecticut administration and the pledge for commitment of University resources to the development of NERAC influenced the decision of NASA to consider implementation of a center on the campus. These pre-award activities culminated in the submittal of a study proposal in early 1966.

The period from June 1966 to June 1967 was spent studying the problems of full scale implementation. Some limited services were provided from the NASA tapes on a cost recovery basis. In July 1967, the center was declared operational and a full information services capability (both automated and manual) was publicized. In the interim several enterprising center directors have expanded the available machine-readable data base resources through cooperative agreements with sister RDCs and other non-NASA sponsored processing centers and by acquisition of additional data bases.

The dominant roles in the planning activities leading to a University decision to support the implementation of the NERAC facility were shared by:

1. The Dean of the School of Business Administration, who identified the needs of the local business community, prepared the proposal to solicit NASA support, and administered the early development activity;
2. The Graduate Dean of Research, who provided consultative support;
3. The Director of University Libraries, who identified additional data bases which would expand the utility of the services;
4. The Director of the University Computer Center; and
5. Members of the School of Business Administration faculty.

During this start-up period, the University provided substantial financial support to the development activities. Since the major thrust of the center services was geared toward a

commercial market, little involvement of other academic departments or the University Library resulted. The Library collections and reference services were, however, heavily used as back-up for manual searches and to provide hard copy text of items identified through searches. There was also some experimentation activity by NERAC in concert with the University Library, supported under a grant from the University of Connecticut Research Foundation and directed towards the investigation of the feasibility of providing access to machine-readable bibliographic data through the Library. Results of this study were inconclusive and have had no major effect on NERAC-Library operational relationships.

III. Management and Organization

Since the advent of NERAC, the operations have been primarily oriented toward service to the commercial and industrial sectors of the region. Except for the minor experimentation activities in concert with the University Library, little emphasis has been given to provision of search services to the academic research community.

The various administrative and management roles associated with the NERAC activities are shared primarily between the Vice President for Academic Programs, the Dean of the School of Business Administration and the Director of NERAC. Final decision authority rests with the Provost. Day-to-day Center operations policy is formulated and administered by the Director subject to NASA directives and University protocol.

The operational costs for NERAC approximate $525,000/year, one half of this sum being provided through NASA and the University

support, the remainder being recovered through revenues generated by search services and other special contract computer services.

In addition to the NERAC offices in Storrs, Connecticut, marketing offices have been opened in Philadelphia, New York, and Boston. The NERAC staff consists of approximately 17 full time employees including the Director, marketing representatives (4), computer operations personnel (3), information specialists (5), accounting personnel (1) and administrative assistants (3). Other information specialist personnel are drawn from the University of Connecticut faculty on an as-needed basis.

IV. Service Center Operations

A. Services Provided

NERAC operational services include current awareness and retrospective computer searching on several in-house data bases plus manual searching at the local libraries. Other search centers, under cooperative agreements, provide processing for search requests not appropriate to the in-house machine-readable resources.

The in-house data bases available as of the date of this survey are those produced by:

National Aeronautics and Space Administration (NASA)

National Technical Information/Government Reports Abstracts (NTIS/GRA)

American Society of Metals (ASM)

World Aluminum Abstracts (WAA)

Educational Resources Information Center (ERIC)

Chemical Abstracts Condensates (CA) -- current awareness only

Current Programs (CP)

NERAC also provides document delivery services utilizing the various information services of the Federal Government (NASA, NTIS, etc.) as well as the photocopying of pertinent material from the campus library collection.

B. User Interface

There is no interactive search mode to permit direct user access to the NERAC services. Assistance to users is provided through discipline-oriented (PhD level) information specialists located either at NERAC or within several of the University departments. NERAC prefers that search strategy design and profile preparation be performed by its resident staff rather than by the users themselves; thus no user training is required.

C. Search Strategy Design

Information search requests are initiated by the user via the telephone. "Information Retrieval Search Request" forms are provided for users who wish to submit a written problem statement. Search strategy and the subsequent profile development activities are performed by NERAC specialists skilled in the appropriate technical fields. Although each information specialist is trained to search several data bases, there is an operational tendency to specialize for the benefit of the ultimate user and to feed profiles to the subject specialist in the appropriate area. All output is reviewed by the information specialists as a normal practice prior to transmission to the user.

D. Promotion and Marketing of Services

NERAC carries on an active and successful marketing program in the New England and Middle Atlantic states. A multifaceted

direct sales approach is used in soliciting interest and acceptance of computer-based services at the upper echelons of industrial management. Bulk purchasing of information services is emphasized. Market resources expenditure to attract the academic community has been minimal.

E. Information Specialist Training

Information specialists at NERAC are expected to have completed formal education leading to a PhD in a scientific field (chemistry, physics, etc.). Training of these specialists in the use of the several data bases is accomplished through several weeks of on-the-job experience working in concert with experienced personnel at NERAC. There is no formal training program documentation.

F. Processing Center Activities

NERAC processes approximately 3000 SDI searches and 2500 retrospective searches per year. Input to the in-house data bases was extimated at around 500,000 records during the last year. The search processing system at the present time is underutilized (20 to 25 searches per day), and the hardware would allow for a five-fold expansion of searching activity.

G. Processing Center Operational Cost

Approximately half of the operational budget is derived from search income. Sales to industrial users account for 60% of the search income, the remainder being provided from other user sectors (governmental, academic, etc.). Data indicating dollar amounts of operational costs were not made available.

V. Services Usage

Current awareness searches are run on the in-house data bases

whenever current issue or update tapes are received from the supplier. Retrospective searches are scheduled as demand requires. Since a dedicated computer is available, quick response searching requests can be accommodated.

VI. User Community

Information descriptive of the NERAC user community was not made available.

VII. Processing System Characteristics

A. Information System Description

The NERAC search system is linear search-batch processing oriented, utilizing an IBM 1130 computer in a dedicated operational environment. Software is in Fortran. Software is transportable to any IBM 1130 with tape drives although the present level of documentation is limited due to allocation of NASA support to other more critical areas. Future plans call for an upgrade to IBM 370 hardware in May 1974.

VIII. Survey Participants

For their several contributions to the survey effort the NASIC staff extends its appreciation to the following NERAC staff and University of Connecticut administration:

Kenneth G. Wilson, Vice President for Academic Programs
Hugh Clark, Associate Dean for Research and Director of Research Foundation
Daniel U. Wilde, Director, NERAC
John P. McDonald, Director of Libraries
Norman Stevens, Associate Director of Libraries
Paul Hengstenberg, Regional Manager, NERAC

SUMMARY REPORT OF

A NASIC SURVEY OF MACHINE-READABLE DATA BASES

Their Administration, Services and Uses on University Campuses

I. General Information

A. Institution Surveyed:

University of Connecticut

Storrs, Connecticut 06268

B. Resident Information System/Center Name:

Social Science Data Center

C. Date of Survey: October 5, 1973

NASIC is supported by the National Science Foundation under Grant No. GN-37296 and is a Research Program of NSF's Office of Science Information Service.

II. HISTORICAL BACKGROUND

The Social Science Data Center (SSDC) was established on the Storrs campus of the University of Connecticut in the fall of 1968. Implementation of SSDC resulted primarily from the personal conviction and effort of Everett C. Ladd, Jr., Professor of Political Science. Fostered by the early interest and continuing support of the Provost, SSDC represents the University's visible commitment to improving the status of the social science departments, to providing a laboratory facility for faculty to undertake research in the social sciences, to establishing facilities for improvement in the training of graduate students, to developing incentives to aid faculty upgrading and more recently to improving the teaching of undergraduate majors in the social sciences. Through the facilities of SSDC, students, faculty and other researchers have computer accessibility to a diverse collection of data covering many areas of social, political, economic and demographic inquiry conducted in the United States and abroad.

III. MANAGEMENT AND ORGANIZATION

A formal organization of SSDC was made possible in 1968 when the University was accepted into the Interuniversity Consortium for Political Research (ICPR) at the University of Michigan and arrangements were made to share the resources of the Roper Public Opinion Research Center at Williams College, Williamstown, Massachusetts.

Since its inception, SSDC has been under the direction of Professor Ladd. SSDC as an institute reports to the Vice President

for Academic Programs. The director of SSDC is assisted by an interdisciplinary Faculty Advisory Committee composed of representatives from the University Research Foundation, University Library, University Computer Center and faculty. Operational policies are formulated by the director and reviewed by the Vice President for Academic Programs and approved at the Provost level.

Operation of SSDC is funded primarily through the Office of the Provost as part of the University budget. Some additional support has been provided through a grant of $120,000 from the Research Commission of the State of Connecticut in 1970. SSDC also receives some continuing support through the University's research funds and from grants awarded by outside sources.

SSDC's staff, consisting of social scientists, systems analysts and computer programmers, is available to assist students and faculty who wish to utilize or learn about the resources of the Center. Frequently the staff is called upon to:

-- demonstrate location of appropriate data in the archive

-- assist in the use of data sets and explain the format of codebooks

-- provide guidance in the selection and use of software packages

-- assist in computer programming for research projects

-- seek out and, where possible, obtain data sets not currently in the Center's archive which are necessary for the pursuit of a particular research interest

-- initiate regular workshops and seminars in the use of software packages

IV. SERVICE CENTER OPERATIONS

A. Services Provided

The SSDC makes available, both on an institutional and state level, expanded social science research opportunities by gathering and systematically organizing a wide array of social and political data in machine readable form; by assisting in the restructuring of personal data holdings where necessary to facilitate analysis; by providing an extensive collection of computer software packages appropriate to the analysis of social data; by responding to inquiries of individual faculty, students and representatives of local and state governments about the resources of the SSDC and about social data analysis generally; by sponsoring workshops and courses which provide formal instruction in social data analysis; and by consulting with faculty for the use of the social science center's resources in their own course offerings. These services are provided at no charge to campus users. Non-university use is accommodated by contract arrangements to recover computer time costs.

The principal sources of holdings in the SSDC Data Archive are the Inter-University Consortium for Political Research (ICPR) and the Roper Public Opinion Research Center. A comprehensive listing of the SSDC data resources can be found in the 1973 "Center Guide and Annotated List of Holdings" which is available from the Center.

B. User Interface

Students and faculty who utilize the data and computer programs at SSDC have access to the Center's on-line terminal

link with the University's Computer Center. In addition to the terminal link SSDC also makes available various types of tab card equipment.

C. Promotion and Marketing of Services

Some program emphasis has been given to publicizing the availability of the Center's resources. Personalized letters to the faculty, brochures and a rather comprehensive catalog of services have all been included in the promotional activities. However, the most successful technique appears to be the development of application-type workshops which allow "hands on experience" for potential users.

Some regional promotion, perhaps in concert with NASIC, is presently under consideration.

V. SERVICES USAGE

A major service for researchers interested in social data manipulation and analysis is provided through the several computer software systems available through SSDC and maintained by the University's Computer Center. This software library includes the University of California's BMD programs, the University of Chicago's SPSS library, Harvard's DATA-TEXT system, the University of Michigan's Guttman-Lingoes series, SSDC census display programs, and the SSDC STAR program. OSIRIS (University of Michigan) is the most widely used general analysis and management "package".

As a member of the Inter-University Consortium for Political Research, the Center acquires all ICPR data in computer form and pre-processed in a manner permitting immediate use of OSIRIS. STAR was developed in response to the Center's need to be able

to work with data from a variety of sources and of a wide quality range.

VI. USER COMMUNITY

Since its inception, SSDC has served several thousand users, largely drawn from the institution's faculty, graduate and undergraduate communities and some state agencies. Academics from other institutions have been served from time to time as well. Users seem to be equally distributed between the political science and sociological disciplines, with somewhat limited interest also exhibited in the field of economics.

At the time of the survey, two users of SSDC services were interviewed. Both users had recently performed statistical manipulation using the off-line mode with the actual analysis strategy being formulated by the staff personnel of SSDC. In the opinion of these users, SSDC services were quite easy to use; however, both expressed concern over the logistics involved in traveling from SSDC to the Computer Center for batch services. Neither user reported any change in their personal use of traditional library services as a result of the availability of SSDC services. Opinions differed as to the impact on usage of SSDC services should charges be instituted.

VII. PROCESSING SYSTEM CHARACTERISTICS

On-line access is accommodated through an IBM 2741 terminal link with the University's IBM 360/65 computer. The operating system is OS and supports a telecommunications network using both teletypewriter and CRT terminals. While most of the SSDC holdings are stored on tape, frequently accessed subsets are

recorded on an on-line IBM 2314 Direct-Access Storage device having a capacity of 20,000,000 bytes. The data are available through batch processing, remote job entry, or conversational PL/1 programming (CPS).

VIII. SURVEY PARTICIPANTS

For their contributions to the survey effort the NASIC staff extends its appreciation to the following members of SSDC staff and University of Connecticut community:

Kenneth Wilson	Vice President for Academic Programs
Hugh Clark	Acting Graduate Dean and Associate Graduate Dean for Research and Director of Research Foundation
Everett C. Ladd	Director, SSDC
John P. McDonald	Director of Libraries and Member, SSDC Advisory Committee
Norman Stevens	Associate Director of Libraries and Member, SSDC Advisory Committee
William Slysz	Director of Technical Services, SSDC
Peter Hooper	SSDC staff
Henry Krisch	Assistant Professor, Political Science

SUMMARY REPORT OF

A NASIC SURVEY OF MACHINE-READABLE DATA BASES

Their Administration, Services and Uses on University Campuses

I. General Information

A. Institution Surveyed:

IIT Research Institute
10 West 35th Street
Chicago, Illinois 60616

B. Resident Information System/Center Name:

Computer Search Center (CSC)

C. Dates of Survey: October 18 and 19, 1973

NASIC is supported by the National Science Foundation under Grant No. GN-37296 and is a Research Program of NSF's Office of Science Information Service.

II Historical Background

The IIT Research Institute (IITRI) is a Chicago based not-for-profit contract research institution staffed by some 1300 scientific and engineering professionals. Though closely associated with the Illinois Institute of Technology, IITRI is an independent organization. In the area of information systems, the Information Sciences Section of IITRI works under contract on programs of basic and applied research in the several disciplines associated with the acquisition, storage, processing, retrieval and distribution of information. The bibliographic search services are provided through the staff of the Information Sciences Section.

Prior to 1967, IITRI had operated a Chemistry Information Science Center. As a result of the efforts of the Manager of the Information Sciences Section of the Chemistry Research Division, consideration was given to expansion of the center's capacity. Several options were explored and a decision was made by IITRI's administration to concentrate heavily on research in the techniques for information storage and retrieval with a lesser emphasis on the provision of services. In 1967 discussions were held with NSF to ascertain Foundation interest in supporting research, initially emphasizing the development of more effective techniques for utilization of the Chemical Abstracts tape services. A proposal was submitted to the Foundation in 1968 outlining three objectives:

1. Development of techniques to improve the effectiveness of retrieval and dissemination of chemical information (including a transportable software system),

2. development of service products to match the real needs of research scientists, and

3. development of a self-supporting information center which would contribute to research in the information sciences as well as provide bibliographic and other search services.

Support for the four-year development project was provided by the NSF Office of Science Information Service under Contract C554, awarded in June 1968. During this development effort members of the IITRI research staff contributed time to the evaluation of the pilot services. The Institute also agreed to provide some financial support during the operational phase of the center if operations subsidization proved necessary.

The dominant roles in the planning activities leading to the decision to expand the chemical information centers capacity were shared by:

1. the Director of the Chemistry Research Division, who was administratively responsible for the development effort;

2. the former Manager of the Information Sciences Section, who established the program objectives and workplan and participated in the development of the proposal to the Foundation; and

3. a senior scientist at IITRI, who served as technical consultant to the proposal team and later served as Principal Investigator during the first three years of the contract.

Services have been made available since mid-1969 as follows:

6/68 - 6/69 - experimental services at no charge

7/69 - 3/71 - pilot services provided on a partially subsidized basis

4/71 -12/72 - full services provided on a fee-for-use basis

The contract with NSF was successfully completed in December 1972, and the Computer Search Center (CSC) has since been in operation on a full cost recovery basis.

III Management and Organization

The Chemistry Research Division of the IIT Research Institute has long assumed administrative responsibility for the provision of chemistry-related information services. CSC policy is formulated and administered at the Director of Chemistry Research level. The CSC activities, although fully supported through user charges, are budgeted through the Chemistry Research office which is committed to supporting up to 30% of the center costs in the event of insufficient revenue.

Daily operations of the Computer Search Center are directed by Peter B. Schipma, who in his capacity of Manager of the Information Sciences Section reports to the Director of Chemistry Research. Ms. Martha Williams, who served as the project leader throughout the development phase, continues to participate as a consultant to the center staff.

The CSC is operated by IITRI on a cost center basis. New data bases and services can only be offered when sufficient revenues from the existing services build up the necessary capital to fund the new ventures. IITRI has been able to encourage some user subsidization of new services (e.g., the POST data base is being provided through cost support from one user who was willing to pay for the data base implementation.)

At the time of the survey the Information Sciences Section employed a staff of approximately 17 persons in both full and part-time positions. This staff includes the Manager, a research chemist, associate chemists (1 full-time and 2 part-time), an assistant engineer, an assistant mathematician, assistant physicists (1 full-time and 1 part-time), technicians (3) and assistant technicians (3 full-time and 2 part-time).

IV Service Center Operations

A. Services Provided

The CSC provides a variety of search services including current awareness searches, retrospective searches, private library development and maintenance, and software installation. In addition to machine searching, CSC also offers manual search services. Current awareness is the principal service offered by CSC and it has been operational since September 1969. Data bases maintained at CSC include:

1. Chemical Abstracts Condensates (CA Cond.)
2. Compendex (EI)
3. Food Science and Technology Abstracts (FSTA)
4. Polymer Science and Technology (POST-to be available in June 1974)

Through arrangement with other data base processors, retrospective searches can be run on the Biological Abstracts, Psychological Abstracts, NTIS, MEDLINE and ERIC data bases.

CSC discontinued in-house processing of the Biological Abstracts tapes when the tape supplier (BIOSIS) undertook to provide services directly at a competitive price. However, due to the quality of the CSC profile preparation, several users maintain CSC-produced profiles when using the BIOSIS processing services.

In addition to the above services CSC also provides two other bibliographic search-related services, topical notices and private library development. Topical notices serve as periodic alerts to information on any of several specific topics including ozone, nitrates, asbestos, phosphates, pesticides, solid wastes, air pollution, sulfur dioxide, noise pollution, water pollution, thermal pollution, occupational safety, waste water treatment,

air pollution legislation and heavy metals contamination. These notices are produced by running generalized profiles against update tapes for the Chemical Abstracts Condensates and Engineering Index data bases. The cost for subscription to this service is low ($50 per year) since there are several subscribers to each topical notice. Should greater specification be desired, the subscriber is urged to have a customized profile developed under the regular current awareness service.

The private library service provides citations retrieved by CSC searches on magnetic tapes in lieu of the standard card stock printout. These tapes can serve as a subset data base into which the user's own materials in machine readable form can be merged. CSC offers a range of processing options to the subscriber to the private libraries service. Costs for these services are quoted on a per job basis, the usual rate being $150/year for semiannual output.

CSC also offers system consultation to organizations implementing in-house bibliographic data processing capabilities. Finally, CSC has future development plans that include expansion of service and data base coverage (e.g., a shipbuilding data base in early 1974), implementation of an on-line profile development capability, and implementation of an on-line distribution system.

B. User Interface and Search Strategy Design

As a general practice, the IITRI staff communicates directly with the user. There is, however, one industrial user organization that channels the requests of individual users through the company's librarian. The user is normally requested to state his question in writing prior to his appointment with the IITRI specialist. (Some users logistically are unable to appear at

IITRI in person so these interviews are conducted either by correspondence or telephone.)

To aid in profile development for machine searching, IITRI has prepared a Key Letter In Context (KLIC) Index which is presently available on 24 microfiche for $500. Each fiche contains 208 frames, with the last frame on each fiche being an index to that sheet. The KLIC Index was prepared using a single recent volume of Chemical Abstracts and is especially useful for left truncation and for retrospective searches. IITRI also has prepared a hard copy truncation guide for Chemical Abstracts searches based upon the KLIC Index. For all volumes of all data bases IITRI maintains a frequency listing of title words and key words on microfiche.

Users are allowed unlimited modifications to their profiles but a $25 fee is levied when major search strategy redesign is required. Experience suggests that most profiles are revised a minimum of 3 times before the user expresses complete satisfaction. Manual review of search results by the IITRI staff is a general practice. For modified profiles IITRI checks to see if all changes occurred properly. New profiles are closely examined and some culling is done at this stage. Profiles are reviewed every 3 months, and if questions arise search results from these profiles may be monitored. If a user remains unconvinced that profile revision is in his best interest, IITRI will usually run a parallel search with a new profile and present the results to the user for comparison.

In those instances where users choose to restrict search output, IITRI maintains a record of all hits, regardless of the cutoff, for a period of four months in order to allow backtracking on profiles if a user expresses concern about the utility of his results.

For users without any time constraints, IITRI recommends using the SDI service for a few issues before preparing a retrospective search strategy. Approximately 75% of all retrospective machine searches users have a prior SDI search performed.

IITRI provides retrospective searching on the CA Condensates and Compendex data bases back to 1970. No weights are used in development of strategies for these searches. All output from retrospective searches is reviewed by an Information Specialist who sometimes will cull out irrelevant hits. IITRI promises a maximum of two weeks for delivery of output from retrospective searches, although the actual turnaround time averages ten days. More than 75% of the users find a two week guarantee satisfactory; the remainder are willing to pay the added cost associated with quicker response.

Because FSTA service was initiated in 1973, retrospective searches on that data base are done manually. IITRI also performs manual retrospective searches on Chemical Abstracts and Engineering Index for volumes prior to 1970 and on any other data base or any subject as requested by a user. Retrospective author searches are also performed manually. All manual searches utilize either IITRI's own printed sets of Chemical Abstracts and Engineering Index or the facilities of the nearby John Crerar Library.

For manual searches the time of the Information Specialists is charged at a rate of $15-17 per hour. While these searches once accounted for half of the Specialists' time, there are now only about two manual searches undertaken per month. Furthermore, most of the time required for such searches, often 3-4 days, is spent by lower-paid technicians or by part-time employees (often former Specialists). Thus Specialists do not devote more than a few days per month to manual searching.

Search output is available either on paper or on 5 x 8 card stock. Users of retrospective services tend to request the two forms about equally, but SDI users lean very heavily (about 95% - 5%) to card output. The output package sent to a user contains:

- the full hit record
- profile terms causing each hit (not included in retrospective searches)
- card with abstract numbers of citations (the user is asked to indicate relevant output)
- frequency listing for the specific data base issue of each profile term, with ORed terms logically grouped
- a separate evaluation form

The user also has the option to modify the output sorting order to best meet his needs.

During the first year and a half of CSC operations, the rate of return for the evaluation forms was very high because users felt obligated to provide evaluation as "compensation" for the free services. With the initiation of user charges, the rate of return has declined to about 57%. Approximately 75% of the forms returned are received within two weeks, although the range is from one day to 18 months. The experience of CSC has been that users with new or revised profiles tend to return their evaluation forms within a week.

C. Promotion and Marketing of Services

IITRI focuses its marketing activities toward industrial users since they have proven the most receptive to use of search services on a fee-for-use basis. Most direct contacts made with users involve discipline-oriented discussions with the IITRI professional staff. These contacts are usually made at three levels within the user organization: with the scientist for problem definition;

with the librarian for logistical considerations; and with the research administrator (or director) for payment authorization.

CSC has no staff member whose function is solely marketing. All CSC personnel contribute to the marketing effort, with the major responsibility residing with the Manager who devotes much of his time to this activity. In addition, many of the professional staff from other components of IITRI, particularly other sections of the Chemistry Research Division, inform clients and potential clients of other IITRI services about the availability and utility of the search services.

New users are allowed a no-cost trial service period. Formerly IITRI allowed a 3-month period to elapse before commencing the billing process. This has since been reduced to one search except for the CA Condensates data base where a search of both an odd and even issue is allowed. IITRI is currently experimenting with a trial period for Compendex at a reduced rate of $55 for 6 months. IITRI has not yet completely analyzed the results of this type of marketing aid, but indications to date seem encouraging.

The most successful marketing techniques have been:

(1) IITRI Workshops - IITRI holds workshops twice a year. Each workshop runs for approximately 2½ days and is limited to an attendance of about 30 people (both potential users and librarians). One section of the workshop is software oriented. At these workshops, trial searches are often done against two or three data bases. In addition to serving educational purposes, they also provide a good public relations vehicle for solicitation of new users. Usually there are 3 - 6 immediate sales following a workshop. About 15 other sales usually result from the workshop activities during the year.

(2) Talks to Specific Research Groups - IITRI welcomes every opportunity

to talk to research groups both large and small. A free search is sometimes offered to one or more in attendance in order to generate the opportunity for later continuation of promotional dialogue with the group.

The least successful marketing technique, with a response rate of less than 10%, has been mass mailings. Success of this technique is highly dependent on the orientation of the mailing list used. Bench level scientists seem to be more responsive to mass mailings than do administrative people.

One of the more significant educational efforts of the CSC program was carried out in cooperation with Illinois Institute of Technology (IIT), where a "Modern Techniques in Chemical Information" course has been offered since 1969. The course is open to second year graduate and upper division undergraduate students in the Chemistry Department through a subcontract from the CSC program to the IIT Chemistry Department and is taught by staff members from both IIT and IITRI.

D. Information Specialist Training

The CSC employs three Information Specialists, one for each of the available in-house data bases. IITRI prefers to employ Specialists who have had past experience in literature searching although not necessarily on mechanized data bases. Two of the present Specialists have earned Master's degrees in science disciplines, and the third is in the process of completing the credit requirements for a Master's. Specialist training begins with one week of observation of the more experienced Specialists. Approximately one month is spent handling telephone inquiries and preparing profiles with guidance. The trainee is expected to review all past profiles developed for an assigned data base. Approximately six weeks is required before the Specialist is qualified to work alone.

E. Processing Center Activity and Services Usage

At the time of the survey, there were 200 unique current awareness profiles in the CSC system. Most of these profiles have been prepared for industrial users, although approximately 30 profiles are currently active for academic researchers working under research grants. It has been estimated that each industrial profile is used by an average of two bench scientists. On the SDI searching IITRI strives for a 30% precision rate with a 60% recall factor. About 5% of the profiles are input for expected negative search results, and another 5% of the profiles specify a very limited output of about 20 items. Every pharmaceutical company using the IITRI services has at least one profile on its own trade names. As of October 1973, only two of the retrospective searches undertaken were performed for academic users.

The data bases processed by the CSC are in a common format and new issues must be reformatted prior to processing. The IITRI staff has prepared conversion programs for over a dozen data bases. Approximately 70% of the coding for reformatting of the currently used data bases is devoted to compensation for anomalies in the tape issues. For CA Condensates retrospective searches, IITRI separately inverts each volume, back through volume 70. Inversion is done about one month after a volume is completed, with the file including key words and title words. There is no inverted file access by either author or section number, but the latter is compensated for by the use of terms with NOT logic. Word frequency listings are available for each full volume of the CA Condensates data base. IITRI also maintains a sample tape for the first two issues in Volume 78 of CA Condensates, in order to test machine retrospective search profiles when time permits. The Compendex file is not inverted but single volume tapes are maintained back to 1970.

IITRI pays royalties to data base suppliers on a per hit or per profile basis. For manual searches, IITRI has adopted a policy of payment of royalties for Chemical Abstracts in order to prevent confusion and to standardize its invoicing and hit reporting procedures.

V. Processing System Characteristics

A. Information System Description

The CSC system was designed to: 1) provide a variety of information storage and retrieval-type services from a multiplicity of data bases, 2) permit use of flexible search strategies, 3) allow for variable sort options, and 4) accommodate varying output media. A modular approach was used to develop one generalized search software system that would be easy to modify and alter and would be machine independent and installation independent.

B. Hardware Configuration

The several data bases maintained by the CSC are presently processed through a local service bureau using an IBM 360/65. The equipment will be upgraded to an IBM 370/158 early in 1974. RJE is used for machine retrospective searching.

C. Software

The service bureau's operating system is IBM OS/MVT with HASP. At the time of the survey, IITRI had successfully tested the search program, written in the PL-1 language, on 15 different IBM 360 and 370 configurations. Although the choice of PL-1 as software language initially limited replication of this search capability to centers employing IBM 360-370 systems, recent compiler developments by other equipment manufacturers have now served to reduce this machine dependency.

D. Operational Environment

All IITRI production runs are made on Saturday of each week. Profile

testing is usually performed on the preceding Thursday or Friday. The output is delivered to CSC by Tuesday morning. Current awareness search output is usually mailed by the Friday following the computer run. Retrospective searches can be performed during the week with a one-day turnaround by the service bureau if there are no conflicting priorities. When possible, however, retrospective searches are batched over the weekend to reduce cost. IITRI holds back on mailing its CA Condensates search output for about four days so that the search results will not arrive too far in advance of the printed Chemical Abstracts issue.

VI Survey Participants

For their several contributions to this survey effort the NASIC staff extends its appreciation to the following staff of the IITRI Research Institute:

Morton Klein	Director, Chemistry Research Division
Peter B. Schipma	Manager, Information Sciences Section
Patricia A. Llewelyn	CSC Staff
Mary Ann Romberger	CSC Staff
Scott E. Preece	CSC Staff

and to Stuart Rice, Chairman of the Chemistry Department of the University of Chicago.

SUMMARY REPORT OF

A NASIC SURVEY OF MACHINE-READABLE DATA BASES

Their Administration, Services and Uses on University Campuses

I. GENERAL INFORMATION

A. Institution Surveyed:

The University of Pittsburgh

Pittsburgh, Pennsylvania 15213

B. Resident Information System/Center Name:

Campus Based Information System (CBIS)

Knowledge Availability Systems Center (KASC)

C. Dates of Survey: October 30 and 31, 1973

NASIC is supported by the National Science Foundation under Grant No. GN37296 and is a Research Program of NSF's Office of Science Information Service.

II. HISTORICAL BACKGROUND

The Campus Based Information System (CBIS) at the University of Pittsburgh is one of several university-based centers for which the Office of Science Information Service (OSIS) of the National Science Foundation has provided developmental support during the past few years. The development of the CBIS as a "one stop" information service center has been an evolutionary process. Pre-grant activities at the University were initiated in early 1963 by the then Chancellor who adopted a charter to "develop a program of research, operations and teaching in the information sciences." The present Director of the Office of Communications Programs, Professor Allen Kent, was recruited to undertake the planning and program development activities in support of the charter. During these early efforts, the Vice Chancellor for planning took an active part in nurturing the teaching programs of the evolving Department of Information Science.

Established in 1963, the Knowledge Availability Systems Center (KASC) represented the University's early commitment to the information sciences teaching and research objectives. The operational function of KASC has, since its inception, been sponsored by the National Aeronautics and Space Administration under its Regional Dissemination Center (RDC) Program. The early concept and argument for promoting the implementation of an RDC at the University stressed the operational aspect of KASC as a means for supporting "internships for information scientists." KASC's operations are primarily

geared to the provision of search services to the private and industrial sectors.

Previous to the implementation of CBIS, the Chemical Information Center (CIS) was an operating unit of the Chemistry Library and provided campus users access to the Chemical Titles and Chemical Condensates data bases. The CIS development was funded primarily by the National Science Foundation.

In 1966, consolidation of the computer center and related information service programs, the library and the library school resulted from the recommendation of a team of consultants engaged to study the organization of the University. The Office of Communications Programs (OCP) was set up to administer the University Libraries, the Computer Center, KASC, and the Interdisciplinary Doctoral Program for Information Science, and Professor Kent was appointed Director.
In 1970, the Director prepared a proposal to solicit NSF support for the development of a Campus Based Information System (CBIS) over a ten-year time frame. The CBIS was to provide information services to the faculty and students of the University through the combined service capabilities of the Library, the Computer Center and KASC working under the direction of the OCP. NSF Grant No. G27537 was awarded in 1971 in support of the first five years of the development with the Director of OCP serving as Principal Investigator

III. MANAGEMENT AND ORGANIZATION

Since the advent of CBIS, the Office of Communications Programs has assumed the major responsibility for policy decisions relating to the provision of services.

Professor Kent, in his capacity as Director of the OCP reporting directly to the Provost, makes the majority of budget and policy decisions and is, in effect, responsible for the overall administration of both CBIS and KASC. Final decision authority on policy administration formally rests with the Provost. Dr. Elizabeth Duncan, serving as the CBIS coordinator, is concerned with the day-to-day activities of the CBIS while Ed Howie, in the capacity of Assistant Director for KASC, manages the processing activities of KASC. The organizational structure within the OCP is illustrated in Figure 1.

Although the library played a minor role in the original planning and development of CBIS and KASC, it is evolving into a more active role as the status of CBIS becomes more operational and less developmental. The library is currently paying the royalties (approximately $2500/year) for use of the tape services produced by Chemical Abstracts as well as making staff time available for profile preparation and user training. It is planned to have the library eventually absorb the data base acquisition costs as the services expand. A longer range goal of the CBIS program is to incorporate the user service interface within the library as an adjunct to the traditional reference services capability.

Research into information utilization and the problems attendant to satisfying the individual user's need for specific information elements is considered more important than the simple accommodation of university users' needs for access to machine-readable data bases and services. To this end, CBIS has developed several Information Utilization Laboratories (IUL) to conduct

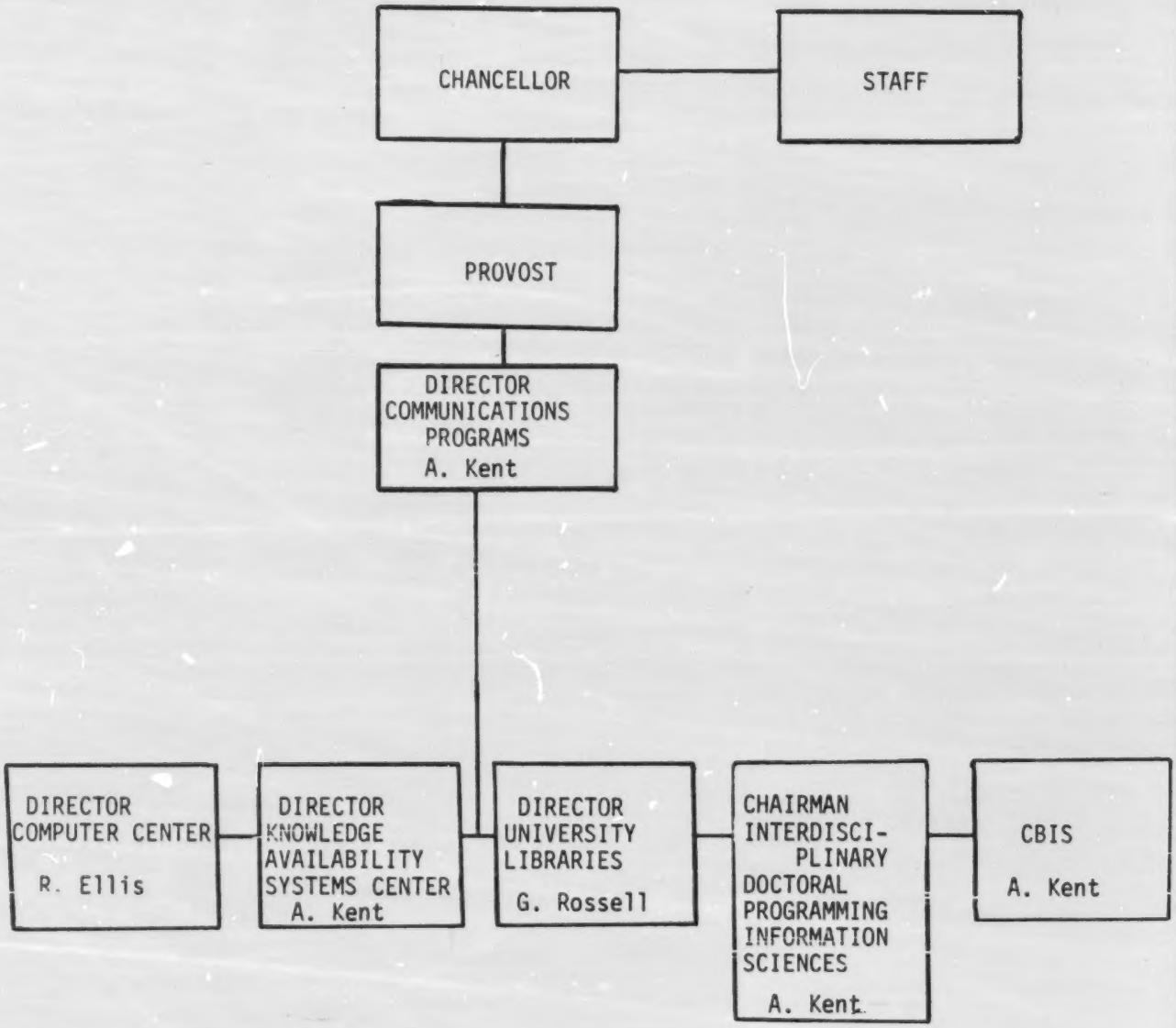

Figure 1. Organization of the Office of Communications Programs

systematic research into methodologies for characterizing the information requirements of the engineering and social science disciplines. The first IUL was created in the Bevier Engineering Library in October 1971. From its inception three science librarians were involved in the Planning Committee of the IUL. Profiles and search strategies are developed by the physics and engineering librarians for the following remotely processed data bases: NASA, ENGINEERING INDEX, CHEMICAL ABSTRACTS, NUCLEAR SCIENCE ABSTRACTS, SPIN and ASM.

In May 1972 the Social Science IUL was established as a joint effort of CBIS and the University Center for International Studies. A good deal of the early effort was spent in considering what data bases could serve the interests of social scientists. It is expected that ERIC, Sociological Abstracts and Social Sciences Citation Indexes will be procured for in-house processing and use by the SSIUL during the third year of the program. For the present, the service to SSIUL users is conducted on an ad hoc basis pending the establishment of a coherent service system (now accomplished according to survey update correspondence dated 3/25/74).

A Central Analysis Unit (CAU) has been organized to coordinate and administer the research and data gathering activities of the several IUL's. Analytical research has been transferred to the CAU which performs the compilation, data reduction and analysis of the data (user case histories) to determine usage trends and user problems, to formulate conclusions and to offer recommendations for CBIS service or operations improvements.

KASC operational services are supported through user charges and NASA funding. The University contributes some support to this aspect of KASC activities. Salaries of the principal CBIS staff personnel are presently paid by the University, and some additional institutional support will be forthcoming during the third year of the 10-year project.

Several advisory bodies have been organized to support the administration of CBIS and KASC. The most active of these committees during the first two years of development were the File Acquisition Committee, the Demonstration Committee, the Computer Center Committee, the Social Sciences Committee, the Engineering Library Committee and the Systems Objectives Committee. More recently a new organization, the Executive Committee for Libraries, has commenced to undertake several activities to raise funds (approximately 2.5 million dollars) for the development and support of the communication programs with the University. These fund raising activites are directed towards the library ($2 million) and CBIS ($0.5 million KASC will also indirectly benefit from the fund raising endeavor.

IV. SERVICE CENTER OPERATIONS

A. Services Provided

As of the date of the survey, CBIS had served approximately 450 campus users with current awareness and retrospective searches from 8 data bases. A total of 180 of these users were accommodated through the IUL's. The data bases included:

EIUL

Chemical Abstracts Condensates (CASCON)
National Aeronautics and Space Administration (NASA)

SSIUL

Educational Resources Information Center (ERIC)
International Political Science Abstracts (IPSA)

Social Science Citation Index (ISI/SSCI)
Secondary Data Analysis Collection (SECDAN)
Faculty Survey Collection (FACSUR)
New York Times Information Bank (NYT/IB)

In addition to these in-house resources, CBIS through cooperative agreements with other institutional-based processing centers (e.g., other NASA RDC's) promotes the use of a broad range of other data bases in an off-line access mode. To date, because of the costs accrued in machine searches using external facilities, these data bases have not been accessed extensively through CBIS.

Faculty and students of the University are presently receiving the CBIS services on a no-charge basis. However, it has been suggested that as soon as practical and when applicable, campus users will be charged for the royalties encumbered and for use of the NYT/IB when the free experimental period ends.

CBIS has discontinued the provision of search services from the ASM/METADEX file due to a low level of usage and apparent low interest within the engineering discipline. Provision of census tape services has been considered, but a campus survey suggested insufficient interest to justify costs. CBIS will undertake to arrange for University of Pittsburgh users to access census services available through the Pennsylvania State University computer center (now accomplished according to survey update correspondence dated 3/25/74).

B. User Interface

CBIS, in collaboration with KASC and the University Center for International Studies, is presently preparing a modular software package to enable both interactive and batch searching of bibliographic data bases. Development of this

system, referred to by the acronym PIRETS (Pittsburgh Information Retrieval System), was initiated in late 1971 in anticipation of a replacement of the University's IBM 360/50 system by the DEC-PDP-10 system. On-line access by CBIS users to the University computer center via PIRETS is still in the developmental process. Thus for some time CBIS services, with the exception of the New York Times Information Bank, will continue to be provided on an off-line batch processing basis.

C. Search Strategy Design

Users resident at the University usually receive search strategy formulation assistance during a series of interviews with IUL staff personnel. Estimates of the time required to characterize the specifics of a search of average complexity and to complete the search profile form vary from approximately 20 minutes to 50 minutes. For current awareness searches, CBIS operational policy calls for a review, by user and specialist, of the results of the first 4 searches and introduction of profile modifications as required. For the on-line New York Times system, a search by the library professional in concert with the user averages 8 minutes per search. For non-delegated searching of the Times Information Bank, the librarian averages approximately 1/2 hour in the training of the user before he can efficiently conduct his own searches.

D. Promotion and Marketing of Services

Some programmatic emphasis, developed as an extension of the market promotion of the RDC operations, has been given to the formal promotion of CBIS services within the University.

Descriptive brochures, campus newspapers and local television (in conjunction with the opening of New York Times Information Bank service) have been used. CBIS representatives have conducted several presentations for University departments representing a heavy potential for use and have also participated in an information science-oriented lecture series for the undergraduate and graduate student communities.

E. Information Specialist Training

The IUL staff usually consists of a professional librarian supported by two or more students (one advanced and one beginner) from the Interdisciplinary Doctoral Program in Information Science (IDIS) at the University. Formal training has been provided on an ad hoc basis and consists of several one day workshops, oriented toward the University library staff. These workshops, conducted by KASC personnel, emphasize the coding methods associated with use of the data bases provided both through cooperative arrangement with the University of Georgia and the local KASC RDC operation. IUL staff achieve the desired level of expertise primarily through informal on-the-job experience working in concert with the more experienced staff.

F. Processing Center Activity

Since its inception CBIS has processed searches both on-line and off-line for approximately 450 users. At the time of the survey KASC was processing 449 current awareness profiles of which 163 profiles represented requests for off-line services by academic users through CBIS.

G. Processing Center Operational Costs

The costs for operating the KASC RDC are estimated at

approximately $350,000/year. Data indicating dollar amounts for specific elements of operational costs were not available.

V. SERVICES USAGE

Current awareness searches are run against only two of the locally processed data bases: CAS Condensates and NASA. The CAS Condensates tapes are run separately in sections and concatenated separately; thus processing a single profile against the even and odd issues is reported as 5 separate current awareness searches. Search results are usually provided within a week of data base update. Retrospective searches are generally processed within a week of the request. CBIS does not at present provide a document delivery service outside of the traditional services of the several libraries, and apparently the library has not sensed or experienced a significant increase in demand for original documents or photocopies resulting from the computer services.

VI. USER COMMUNITY

A profile of the active CBIS user community based on statistics compiled over a 6-month period ending 7/31/73 suggests the following pattern of usage:

Usage by Type of User

	Profile (%)	Searches (%)
University Community	60	31
External Community	40	69
	100%	100%

USER BY DATA BASE

	Profiles (%)	Searches (%)
CASCon		
Current Awareness	29	69
Retrospective	9	3
NASA		
Current Awareness	7	10
Retrospective	3	1
NYT/IB		
Retrospective	50*	16
IPSA		
Retrospective		
SEC DAN		
Retrospective	2	1
FACSUR		
Retrospective		
	100%	100%

*more graduate use than undergraduate use

During the survey of CBIS by NASIC staff members, interviews were held with nine users of CBIS services. These people were not aware of any formal mechanism for user participation in the selection of CBIS data bases. However, one user reported that he had requested that Engineering Index services be provided but was told that it would be too expensive. The users reported that the publicity on the availability of the NYT/IB services has been intense. Other promotional efforts (slide show in School of Engineering, bulletins, brochures, campus newspaper) have resulted in some

interest. Word of mouth from participants in the several advisory bodies has been successful.

The users interviewed generally expressed satisfaction with the services provided through CBIS although several reported some minor dissatisfaction with output delivery time (in excess of 2 weeks) and relevancy of the output.

The majority of the users rated their search needs at the time of request as important, that is, necessary to help determine the course of future work or to help fill gaps in knowledge, but there was also some indication that the processing cycle is not adequate when a person is urgently in need of information.

Several users indicated unhappiness with the timeliness of the data bases themselves. Others interviewed indicated that the results of most of their search efforts were of some value in that the citations retrieved were useful as supplementary or back up information. Two respondents rated the search results as generally very important to their research.

The users unanimously responded that the CBIS services were eas to use and that the IUL staffs were generally helpful in profile preparation. One user commented that the locations of the IULs were not convenient to him and that some decentralization of access (perhaps on-line interaction) would improve the service. One user suggested that Pathfinders similar to those employed at MIT would be helpful. Those interviewed generally agreed that CBIS services had increased or upgraded their usage of traditional library services. In conjunction with their responses the majority of those interviewed stated that their usage would decrease considerably (50% - 90%)

should they be required to pay for the now free CBIS services.

VII PROCESSING SYSTEM CHARACTERISTICS

A. Information System Description

In August 1972, the batch processing capability of PIRETS became operational for the provision of KASC RDC search services on the DEC PDP-10 computer at the University Computer Center. The interactive search modules are still under development, and searching is still restricted to small files in support of this development process. It has been suggested that demand on the present configuration will not permit the necessary dedication of storage capacity in support of an operational on-line system; thus the on-line capability of PIRETS will probably be restricted to use primarily as a tool for search profile development prior to processing searches in a batch mode. (Dedicated disk drive has been obtained, changing this picture according to survey update correspondence dated 3/25/74).

Searchable text files must be structured in the PIRETS standard search format. Programs are available which will allow formatting of private files into the appropriate format. One interesting feature of PIRETS is that both search files and profiles may be prepared using upper case and/or lower case text.

B. Hardware Configuration

Searches for KASC RDC users as well as CBIS users are processed on a Digital Equipment Corporation PDP-10 Model KA-10 (dual processor) computer employing a multi-programmed operational environment (foreground timesharing-background batch processing). Peripherals include 15 magnetic disk devices (model RP03). The

computer is accessed through a variety of terminals, which are ASR-33 teletype compatible and located throughout the campus.

C. Software

The operating system is the standard DEC time share operating system for the PDP-10 dual processor. PIRETS is implemented in MACRO (assembly language) for the PDP-10 computer. Software development and documentation is considered approximately 30% complete. Software is totally machine-dependent so transferability is limited to PDP-10 computers with similar peripheral devices.

VIII SURVEY PARTICIPANTS

For their several contributions to this survey effort the NASIC staff extends its appreciation to the following members of the University of Pittsburgh Community:

E. J. Shoben	Associate Provost for Graduate Studies and Research
Allen Kent	Director, Office of Communications Programs
Glenora Rossell	Director of Libraries
Edmond Howie	Associate Director, KASC
Anthony Debons	Vice Chairman, Interdisciplinary Doctoral Program in Information Science
Elizabeth Duncan	CBIS Coordinator
Paul Kobulnicky	Director, Chemistry & Physics Library
Mary Arnett	Engineering Library Staff
Carl Beck	Director, Center for International Studies
Jack Belzer	Professor, Interdisciplinary Doctoral Program in Information Science
Veronica Bierbaum	Graduate Researcher
Denis Donegan	Professor of Education

Gary Harris	Student
George Klinzing	Professor of Chemical Engineering
Wesley McGinnis	Student
Sean Tate	Foreign Student Research Project
Cynthia Wallet	Research Assistant

SUMMARY REPORT OF

A NASIC SURVEY OF MACHINE-READABLE DATA BASES

Their Administration, Services and Uses on University Campuses

1. General Information

   A. Institution Surveyed:

      The Ohio State University

      Columbus, Ohio 43212

   B. Resident Information System/Center Name:

      Mechanized Information Center (MIC)

   C. Dates of Survey: November 1 and 2, 1973

NASIC is supported by the National Science Foundation under Grant No. GN-37296 and is a Research Program of NSF's Office of Science Information Service.

II Historical Background

The Mechanized Information Center (MIC) at The Ohio State University is one of several university-based centers for which the Office of Science Information Service (OSIS) of the National Science Foundation has provided developmental support during the past few years. The development of the MIC evolved from the interest of Dr. Marshall C. Yovits, Chairman of the Department of Computer and Information Science, and Hugh Atkinson, the present Director of Libraries, who recognized a need for implementation of multidiscipline machine-based bibliographic resources on the OSU campus to support the educational program and research activities of the university community. They were instrumental in the pre-grant endeavors of the Research and Development Division of the University Libraries, in cooperation with the Department of Computer and Information Science, to provide current awareness and retrospective search services from the Chemical Titles data base. The encouraging experience of the introduction of these services provided justification for the university to consider service expansion.

The decision to proceed with the development of the MIC was strongly influenced by a strong commitment of both the university and library administration to:

1. mechanizing operations within the library,
2. holding the line on constantly increasing labor costs associated with library operations,
3. accentuating the service aspect of the library operations, and

4. increasing user access to bibliographic materials with minimal effect on the traditional professional staff-user interface and relationships.

Previous research efforts at the University to develop an on-line library circulation control system and, in concert with the Ohio College Library Center, to implement a mechanized technical processing system to achieve objectives 1 and 2 were viewed as complementary to the research on the user interface necessarily related to objectives 3 and 4. Consequently, National Science Foundation support was solicited in 1970 towards the development of the expanded bibliographic service activity.

NSF Grant No. GN-27458, which was awarded in February 1971, partially supports the four-year program to provide a range of multidisciplinary information services utilizing machine-readable bibliographic and other data bases. During the first three years of the grant the University has contributed substantially (estimated at $100-150,000 per year) to the MIC development program.

The dominant roles in the planning activities leading to the university decision to implement the expanded machine-readable services were shared by:

1. The Assistant Provost who, in his capacity as Budget Officer for the University, assisted in determination of the program objectives and pledged continuing support of the research activity;
2. The chairman of the Department of Computer and Information Science who identified the apparent need for the expansion of the then existing information services and assisted in the definition of the objectives of the development program and development of the justification for expansion;

3. A former Director of Libraries who supported the participation of his staff in the pre-grant activities and in the proposal development effort;
4. The Assistant Director of Libraries for Public Services, now the Director of Libraries, who together with his staff undertook the proposal preparation effort;
5. The Principal Investigator who assisted in program planning and the selection of data bases and also provided technical assistance; and
6. Members of the Library Council who served a proposal review function and offered guidance to the proposal team.

III Management and Organization

Although jointly sponsored by the Department of Computer and Information Science and the University Libraries, MIC is administratively a part of the Public Services Division of the University Libraries. Dr. Gerald J. Lazorick, formerly Associate Professor of Library & Information Science and Director of the Technical Information Dissemination Bureau at the State University of New York (SUNY) at Buffalo, was appointed to the position of Director of the MIC program. The Director of the MIC reports to the Assistant Director of Libraries for Public Services and also holds an appointment in the Department of Computer and Information Science. Administration of the day-to-day operations of the center is the responsibility of the Director and accounts for approximately 25% of his time. Policy decisions for MIC are made and approved by the Director of Libraries subject to the final authority of the Vice President for Educational Services. Advisory support to the Director of Libraries is shared by the Library Council and the Senate Committee on Libraries.

Internally, MIC has undergone several reorganizations during the first three years of development, primarily to achieve improved staff efficiency as the program progressed from the research and development phases towards an operational posture. The latest organization chart (shown in Figure 1) reflects this transition through functional emphasis in several areas: 1) the Information Services staff is being expanded, 2) the programming staff build-up has apparently stabilized, and 3) the second level of MIC management responsibility, formerly delegated to an Assistant Director who coordinated the development activities, has now been transferred to a Coordinator of Information Services who was moved up from a position of Operations Manager.

The bulk of the MIC operational costs are presently supported through the NSF grant. The remainder (approximately 1/3) is paid by the University through the budget of the University Libraries. Upon completion of the grant period, it is planned that the operation of the MIC will be totally integrated into the library with reduced emphasis on research and development and expanded emphasis on service related operations.

MIC, at the time of the survey, employed 13 FTE's including the Director, Coordinator of Information Services, Manager of Programming, Senior Information Specialist, Secretary, Programmers (2), Information Specialists (4), and operations personnel (4). MIC currently supports 5 graduate students for research purposes. This support will extend through June 1974 after which support will decrease to 1 student.

IV Service Center Operations

A. Services Provided

As of October 1973, MIC has provided current awareness services to more than 2800 users and had conducted over 5500 retrospective searches. There is

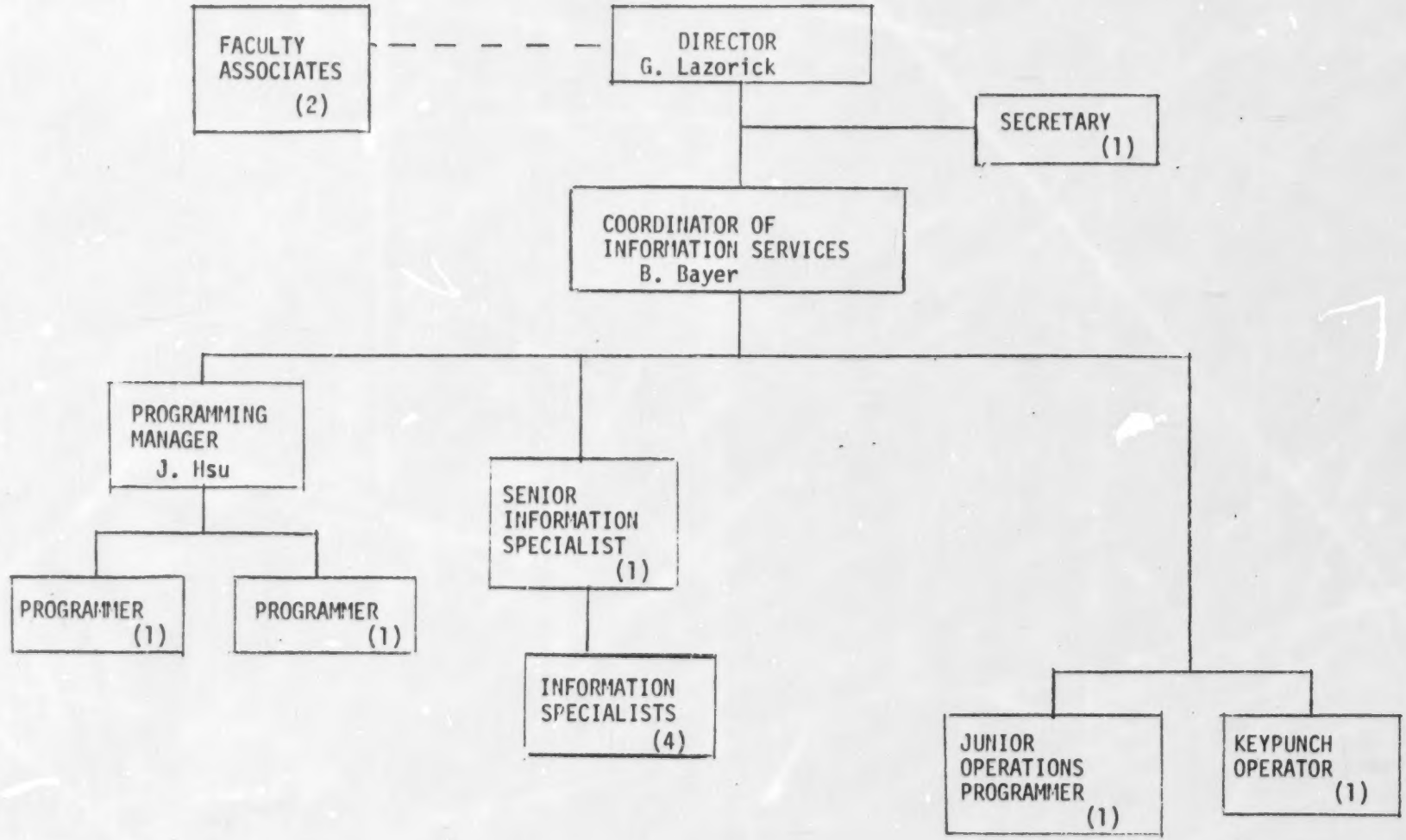

Figure 1 MIC Organization Chart
(in effect November, 1973)

no charge to OSU users for any of MIC's search services. There are five data bases available for current awareness services. There are:

1. Multidisciplinary (which includes PANDEX, ISI SOURCE INDEX, NTIS, MARC, and CONFERENCE PAPERS)
2. ERIC, which includes RIE and CIJE
3. ISI SOCIAL SCIENCES SOURCE INDEX and MARC
4. CAIN
5. CHEMTITLES
6. Psychological Abstracts (added since the NASIC site visit occurred)

For articles in journals held by OSU and for government reports, MIC runs a first page copy service for users of the multidisciplinary current awareness service. Retrospective searches are provided from the multidiscipline, ERIC, and Psychological Abstracts data bases.

B. User Interface and Search Strategy Design

The MIC search system is batch-oriented, with search strategies and profiles developed manually through user/Information Specialist dialogue and interaction. MIC does have a small subset of the multidisciplinary data base on-line for experimental and illustrative purposes.

Assistance in the preparation of current awareness search profiles is afforded to OSU users by Information Specialists resident on the campus. MIC does not employ a detailed interview form but rather a brief interview summary form and a special profile coding form. Once coded, the interest profile is stored in machine-readable form to be run against file updates as they are received at the computer center. The procedures for requesting retrospective services are almost identical, the major difference being that a more defined search strategy is usually employed in searching the larger retrospective data bases. Since strategy design and profile

preparation is usually performed by the MIC Information Specialist, no training of users is necessary. Users are requested on a quarterly basis to confirm or update current awareness profiles on file. A typical user/Information Specialist reference interview lasts 30 minutes. During this interview, data base selection, profile preparation and profile coding decisions are usually completed. For current awareness searches, the general subject area is determined and the available data bases are discussed with the user.

For a retrospective search, MIC Specialists explain to a user how a search is accomplished. They try to get a natural language statement of the problem, but there is no standard list of questions asked of a user about his problem.

In the preparation for searching on the ERIC data base the thesaurus is reviewed with the user. ERIC searches can be conducted using author, title words, identifiers or descriptors.

For coding a multidisciplinary data base search, the Specialist must look up all terms in the Pandex Thesaurus. Several Specialists reported that the thesaurus is difficult to work with. If the term doesn't exist in the thesaurus, it is flagged in the coding as a title or non-thesaurus term. In the coding process, least frequent terms are entered first.

All other data bases are searched using free vocabulary and truncation. A term is automatically searched on no more than the first twelve characters. Right truncation is permitted, but adjacency is not (except by planned but not yet available post-processing). There is also a stop list of about 300 words on which searching cannot be undertaken. Hits are determined by weighting each user term, generating a total significance value for a citation based on the weights given to terms retrieving it and comparing it

to a threshold weight. Weights take values from .000 to 1.000. There are no explicit Boolean operators but various logical situations are developed by the appropriate use of weights. The Specialists try to use a threshold weight of 0.750.

The normal follow-up practice of the Center includes review with the user of output from the first two current awareness searches for a new profile. New profiles are specially tagged and the user is asked to review profile adequacy after three months have elapsed. Although each Specialist can develop profiles for all data bases, there is a tendency to specialize and refer users to Specialists who are the most proficient in areas of interest to the user. Users, on campus as well as at other OSU locations, are not charged for profile preparation or profile revision.

C. Promotion and Marketing of Services

Since the beginning of the program, considerable attention has been given to formal promotion of the free MIC services within the University. A study conducted during the second year of the program was directed toward evaluation of three promotional approaches: 1) an "opinion leadership" technique which relied on word of mouth advertising generated by opinion leaders in selected departments, 2) a blitz campaign directed toward use of more traditional marketing techniques to blanket selected departments with personalized and general advertising media, and 3) a telephone solicitation campaign to initiate dialogue between prospective users and MIC staff personnel preparatory to personal encounters. The results of this study suggest that effective techniques for promotion of information services must contain elements that are 1) informational, 2) educational and 3) pursuasive in order to create the demand. Of these three elements it would

appear that education should receive the major emphasis in marketing programs directed towards the academic research community.

Marketing activities outside of the University community have been limited during the first three years of the program; however, it is expected that some effort will be expended towards encouraging greater search resource-sharing on a cost-recovery basis with other information centers and other university library constituencies.

D. Information Specialist Training

At the present time the MIC operation is somewhat autonomous and its physical location is outside the Main Library. Future plans, however, call for the physical integration of the MIC into the Main Library when the Main Library facilities are expanded in 1975-1976. Thus it was considered essential, at the outset, that the Information Specialists at MIC have library backgrounds in order to effect an orderly transition from the center development phase into the library operations phase. The Specialists are therefore professional librarians who have an interest in automated services and who have demonstrated capacity to interpret technical language and concepts.

The formal training given to the Specialists in the past has consisted of approximately a month of on-the-job training in concert with a Senior Specialist. During this training period, the MIC programming staff usually provides the profile coding instruction. This apprenticeship period is usually followed by approximately a month of profiling activity with frequent quality control checking by other Specialists. A more formalized program is used to teach other staff personnel in the library to perform Information Specialist duties. MIC has already taught OSU reference librarians in the Reference Department of the Main Library, in the Education Library and in the

Chemistry Library. Librarians at several institutions in central Ohio have also had instruction in profile coding.

The MIC Specialists hold a two-hour meeting every two weeks to discuss search strategy development and its attendant problems on a round-robin basis in addition to participation in regularly scheduled MIC and library staff meetings.

E. Processing Center Activity

Since its inception, over 5,000 retrospective searches have been run at MIC, and there are about 150 retrospective searches per week. Approximately 2,000 current awareness profiles were active at the time of the survey (as of May 1974, this figure has increased to 3,700).

Current material files are generated weekly and current awareness searches are also run weekly. Each weekly file for the multidisciplinary current awareness service contains some 10,000 citations. The full retrospective file is updated quarterly, but searches against it are run weekly.

The multidiscipline data base is a single file generated from the ISI Source Tape (from 1968), NTIS (from 1968), Pandex (from Sept. 1971), Current Index to Conference Papers (CICP), and MARC (from 1972). A reported difficulty in building and maintaining the multidiscipline data base arises from variations in tape quality from the multiple suppliers. The Pandex Thesaurus is used to provide some control and all new input tapes are processed against it. The Thesaurus is especially useful for singular-plural descriptors but it also serves as a catch-all for related terms, a function for which it has limited value.

To handle duplication between ISI and Pandex, Pandex is taken as the primary source. There is a machine-stored table of Coden, ISI title, and full journal title, which is used to eliminate duplicative records from ISI tapes.

The table is also used to print on search output cards the OSU library location codes for a journal.

An inverted file index to the multidisciplinary data base contains author, journal CODEN, LC number (MARC), Pandex Thesaurus terms, and non-Thesaurus terms, all of which are searchable fields. The inverted file does not contain the data base source of terms so output cannot be restricted by data base. There is a term frequency list available. The data base itself contains only a portion of the information that may be available on input tapes; for example, NTIS records are stripped of the abstract.

F. Processing Center Operational Cost

A Management Information System for MIC is presently under development, although some of the computational algorithms still need adjustment. Production statistics and computer-generated accounting are used as input (manual with punched cards) for derivation of expense information and budget planning. Products currently generated include:

1. Quarterly Cost and Statistical Report
2. Classification of Users (by ID, department, type, service)
3. User Status Report (date joined, services, etc.)

Products being developed are:

1. Invoice (MIC bills non-OSU users directly and has its own A/R and A/P.)
2. Expected Growth Rate (extrapolations based on past history for growth in profiles, data bases, and computer usage)
3. Annual Report - (retrieve data from historical system summary)

Data indicating dollar amounts of operational costs were not available.

V Services Usage

Data base search output appears as one citation per card containing author, title, and basic citation. ERIC output also contains some descriptors. The card is divided into two portions by perforation. The left side is 3 x 5 and contains the output data whose format and content varies with the type of document cited. The right side is a detachable

stub containing abbreviated output plus data on where the document may be located. If the document is a book (MARC data), the user is asked to call the library. If the document is a government report (NTIS), a reference to the Government Reports Announcements issue containing the abstract is given. If a conference paper (Current Programs), reference is also given to the issue of Current Programs containing an address to write to for a complete copy. If a journal article and if it is held by any OSU Library, a code for a specific branch appears together with the journal citation. An indication of the language is also given for journal articles.

The MIC search process stresses recall at the expense of precision. About 250,000 to 300,000 output cards are printed each month. The quality control activity is provided by running profiles through the system and passing them to the Specialist with prime responsibility for the data base and then to the input coders. Corrections are made without going back to the user. MIC flags words that have a saturation potential.

MIC expects at some future date to add a post processor output system to increase precision while maintaining high recall for selected profiles.

For articles in journals held by OSU and for government reports, MIC runs a copy service. For 10 cents, a user can obtain the first page of the article or the abstract (from GRA) of the report. The user uses the detachable stub to order copies. MIC has its own messengers for this service. Demand is about 100 pages per week from about 65,000 cards per week. Users are billed monthly for this first page copy service. The automated circulation system of the OSU Libraries has an automatic billing of fines feature. MIC plans to look into this for billing of first page service if warranted. For current awareness search services, non-OSU users pay after a trial phase. There is no maximum length of trial period at this

time, mainly because use outside of OSU presently involves only some 150 profiles.

VI User Community

Use statistics maintained by the MIC staff indicate increasing interest in current awareness searching and increased use of social science-related data bases. A preliminary tabulation of the active MIC user community by departments was made available to the survey team for information purposes only and accordingly is not included in this report.

During the survey, interviews were held with several users as well as library staff members not directly involved with MIC activities. The users interviewed generally expressed satisfaction with the services provided by MIC and indicated that it aided them in using the library more efficiently. Some minor dissatisfaction with the services was reported, but these complaints apparently result from a lack of user awareness of factors limiting the success of machine searching in large data bases. Some of these comments stemmed from the system emphasis on recall over precision, where the user received a large quantity of material much of which was irrelevant.

Several users have also expressed dissatisfaction with the softness of the terminology used in the ERIC Thesaurus. Others were not satisfied with the number of hits received from a specific search and had difficulty in accepting the problem to be a data base limitation rather than a profiling error (e.g. science data base not up to date with hard copy version). Some of the users expect the library to have everything on hand and become disgruntled when referred to Inter-library Loan.

Not unexpectedly, the impact of MIC on the other operations within the Libraries has had a mixed reception from the traditional library staff.

While MIC is more closely related to the Library than most university-based centers, there still remain some communication problems to be resolved. The format of the MIC card output is confusing to some users and some library staff alike. The staff manning the telephone operations of the automated circulation control system are somewhat disturbed by the number of calls received where the caller cannot transmit the correct citation information. Others are unhappy with the increased burden of document delivery resulting from the search activities. Since abstracts are not provided with the service, some users have requested hard copies of all citations retrieved without attempting to screen irrelevent items.

These several discussions point out the need for closer coordination between MIC and the Reference Department of the Library and more effective communication at the staff levels of the respective organizations. (Steps to accomplish this have been taken in the months following the NASIC site visit.) It is expected that these coordination and communication problems will be alleviated upon physical integration of MIC into the Main Library.

VII Processing System Characteristics

A. Information System Description

The search software for the MIC system was built upon software that had originally been developed by the Technical Information Dissemination Bureau (TIDB) of the State University of New York at Buffalo for its current awareness system. The major changes made by MIC reflected the difference in data base formats and the nature of the operating environment. A post-search processor is planned for the system to aid in increasing precision while still maintaining high recall.

B. Hardware Configuration and Operational Environment

The searches are processed on an IBM 370/155 Model I H computer configuration employing both tape and disk files. Operation is in a dedicated batch mode on the third shift in accordance with a fixed schedule. The computer is operated by the University System Computer Center of the University.

C. Software

The operating system at the time of the survey was IBM OS/MVT with HASP and teleprocessing capabilities. The print programs are written in COBOL; search, utility and conversion programs are in PL-1.

VIII Survey Participants

For their several contributions to this survey effort the NASIC staff extends its appreciation to the following members of the Ohio State University community:

John T. Bonner, Jr., Vice President for Educational Services

Hugh C. Atkinson, Director, University Libraries

Laurence Besant, Assistant Director for Public Services, University Libraries

Gerald J. Lazorick, Director, Mechanized Information Center

Bernard Bayer, Coordinator of Information Services, MIC

John Hsu, Programming Manager, MIC

and many others from the MIC, the Library and the general University community.

SUMMARY REPORT OF

A NASIC SURVEY OF MACHINE-READABLE DATA BASES

Their Administration, Services and Uses on University Campuses

I. General Information

A. Institution Surveyed:

Stanford University

Stanford, California 94305

B. Resident Information System/Center Name:

Data Information Services Program

C. Date of Survey: November 26, 1973

NASIC is supported by the National Science Foundation under Grant No. GN-37296 and is a Research Program of NSF's Office of Science Information Service.

II. Historical Background

Several computerized literature searching services are currently being made available through the University Libraries on a somewhat experimental basis. These services are being evaluated as part of the cooperative effort between the University Libraries and Stanford Center for Information Processing (SCIP) to develop a campus capacity to provide a broad range of machine-readable search services to the Stanford research and educational communities through the implementation of a Data Information Services Program. The current awareness services from five data bases are presently provided through the Center for Information Services (CIS) at UCLA. SPIRES (Stanford Public Information Retrieval System), developed at Stanford with support from the National Science Foundation, Office of Science Information Service, operates as one of the interactive system facilities of SCIP and provides access to several private files and to the MARC data base for use in library technical processing activities. The MEDLINE and NTIS data bases are currently accessible on-line through the National Library of Medicine and Lockheed Information Systems, respectively.

SPIRES began as an information services research project out of the Communication Department with Professor Edwin Parker serving as Principal Investigator. The development was supported by NSF grant GN830 and design and implementation of SPIRES was carried out by the Director and staff from the Academic Computing Services facility of SCIP.

The advent of other computer-based information services at Stanford University evolved from the interest and early efforts of faculty members from social science departments, who in 1968 petitioned the Library to establish a Social Science Data Archive for acquisition and storage of

machine-readable data. Due to lack of adequate funding, this program was postponed.

In 1969, faculty members again petitioned the University Library to purchase 1970 census tapes but several meetings held during 1969 and 1970 proved inconclusive, again primarily due to insufficient funds.

Faculty interest in data services still persisted and in 1971 the library undertook to ascertain the extent of interest in data base services through a campus-wide survey. This survey also served to identify local data base resources. A number of faculty members proposed the option of the provision of census data services and others on a fee-for-service basis. Support was solicited from the Stanford Research Institute to underwrite 50% of the costs associated with the provision of census services.

This interest prompted the library administration to consider the addition of an information specialist to the staff resources. In 1971, the position of data services librarian, reporting to the Associate Director of Libraries, was established. One of the first tasks undertaken was the development of criteria for the selection of data bases and use of processing services.

III. Management and Organization

In 1972, after the untimely death of the data services librarian, Mr. Douglas Ferguson was asked to assume the technical and planning responsibilities as head of the Data Information Services Division of the library, reporting to both the Associate Director and Director of the Libraries. There is no full time staff. A Faculty Advisory Committee (FAC) under the chairmanship of Dr. Edwin Parker has been organized recently to assist in the formulation of operational policies (e.g., acquisition of data bases, etc.) of the Data Services Program. This committee consists of tenured faculty

representatives (8) from each research center within the University and two student representatives (1 graduate and 1 undergraduate).

The objectives of the Data Services Program are:

- to develop and evaluate new forms of access to computerized information, both bibliographic and numerical;
- to develop policies and procedural capabilities within the Library to handle computer-processable information;
- to develop print resources to support digital resources, and
- to propose to and advise the Director of Libraries on projects and policies which merit support of the Library.

The emphasis of the Data Services Program has been the evaluation of "a new service capability to be provided through existing library staff and organization" without incurring increased costs through the establishment of a separate operational activity.

The philosophy of Stanford University in creating this new service was to minimize costs while undertaking to facilitate access to this new form of information. The library thus serves as a broker, coordinator, and publicizer. It also assigns some book funds to the purchase of data files, presently a minor part of this operation. Although the following section summarizes the "services" provided, it is emphasized that an important aspect of this Data Information Service lies in another area.

There are three efforts that are receiving primary emphasis. One is the compilation of published information on local, regional and national data bases. This file includes reports, directories, advertisements, and other publications which serve as a means of directing Stanford students and faculty to the sources of machine-readable information wherever they may be

in this country or in Canada. The second effort involves compilation of descriptive information about those small data bases (or data files) that are held by the Library, Computation Center, research institutes, or departments at Stanford, and the publication of these as a Data File Directory. The data are also maintained as an on-line SPIRES file for those individuals on campus who have terminals and wish to query the current file in this mode. This directory, first issued in the summer of 1973, is to be updated periodically. It is also planned to expand the contents of the directory to cover similar resources in other academic institutions in the San Francisco Bay area. The third effort involves the collecting of code books for all of those data bases available at Stanford. These books are cataloged by the Library and listed in the public catalog, with a note to indicate whether the University has the data in machine-readable form, and if so, where it is located. This latter project, for example, has obtained dozens of code books for materials obtained by faculty from the Inter-University Consortium on Political Research.

IV. Service Center Operations

A. Services Provided

Current awareness services are presently (November 1973) provided at no cost to the University user through a cooperative arrangement whereby the Center for Information Services (CIS) at UCLA carries out the search and mails the results to Stanford. Four data bases are presently available including:

CAS Condensates

ERIC

CAIN

Biological Abstracts

Some consideration is being given to the imposition of charges for the search services in 1974. Both retrospective and current awareness services are made available to the Medical School users at no cost through the MEDLINE and SDILINE services, subsidized by the National Library of Medicine. Non-university users are currently charged a flat fee of $5 per search. Retrospective searching in the NTIS data base is provided at a fee of $20 per search through an on-line terminal used by the Engineering Library and connected to the DIALOG processing system operated by Lockheed Information Systems in Palo Alto. This experimental service is subsidized out of an endowment fund of the library set up to support innovative research. Other than the processing of MARC tapes for use internal to the library, the data services provided through the SPIRES system are limited to small local data bases.

B. User Interface and Search Strategy Design

MEDLINE and Lockheed (NTIS) services are available on-line with the search strategy usually formulated at the terminal, either by the library staff member or occasionally in concert with the user. Current time averages 19 minutes per search.

Users interested in the current awareness services provided through CIS at UCLA arrange an interview with a branch librarian (located in each of seven libraries) who explains the services and provides a Statement of Interest form on which the user describes his or her research interest. The profile development procedure has been formalized, and procedures have been prepared to assist the librarian. Activities associated with profile preparation, strategy formulation and update average approximately 1½ hours per profile. All of the profiles prepared for UCLA are reviewed by the head

of the Data Information Services Division prior to submittal to UCLA. All search results are sent to the Data Information Services Division from which they are processed and sent to the branch library for review and subsequent distribution to the user.

Frequently Mr. Ferguson suggests profile modifications to improve the search results. If the user concurs, the profile change is initiated. However, the revised profile is not tested until the next file update; thus the impact of the change on the search results is not easily measured (especially for ERIC searches where quarterly updating is the rule and the user often has to wait 6 months for useful results).

C. Promotion and Marketing of Services

The service has been conducted with only limited publicity in order to minimize the expenditure of library resources during the experimental phase. It is recognized that should the experimental activity be expanded or made operational an active publicizing of the service through several campus media would be necessary to produce an increase in the user population.

D. Information Specialist Training

Training of the library participants has been conducted by Mr. Ferguson utilizing documentation prepared by UCLA and the several other processing organizations (e.g., Lockheed). Since requests for services are somewhat infrequent, due to the passive nature of the experiment, librarians are continually reminded by the DIS Librarian to reread the manuals or re-examine previous profile coding sheets prior to the interview with a user.

V. Services Usage

The MEDLINE system usage rate was approaching a level of 200 users/month (1/3 represent profile updating for SDILINE) at the time of the survey.

Approximately 175 current awareness profiles, active in the UCLA system, were received from campus users as follows:

Faculty	64
Graduate	68
Researchers	43
	175

Usage statistics for SPIRES and the Lockheed system were not available. It should be noted that the imposition of charges for MEDLINE searching by non-Stanford users reduced their number by 75%.

VI. Processing System Characteristics

A. Information System Description

The salient characteristics of the CIS operating system at UCLA are described in the survey summary for that institution. MEDLINE and the Lockheed system have been described in several professional publications, and any description here would be redundant. SPIRES is fundamentally a system designed for processing local data bases with both interactive and batch access modes. A joint development between the library and the computer center has led to the development of SPIRES/BALLOTS. BALLOTS is essentially a library technical services on-line system which has regional implications (similar to OCLC). As there are no significant bibliographic data base user services available in either system, a detailed description of this system is not included in this summary.

VII Survey Participants

For their several contributions to this survey effort, the NASIC staff extends its appreciation to the following members of the Stanford University community:

David Weber	Director of Libraries
Earl Borgeson	Associate Director - Operations

Elmer Greder	Associate Director - Resources
Douglas Ferguson	Data Information Services
Laurence Rosen	SPIRES Consultant

and several members of the faculty and library staff who participated in group discussions.

SUMMARY REPORT OF

A NASIC SURVEY OF MACHINE-READABLE DATA BASES

Their Administration, Services and Uses on University Campuses

1. General Information

   A. Institutions Surveyed:

      University of California
      at
      Los Angeles, California 90024
      Berkeley, California 94720

   B. Resident Information System/Center Name:

      Center for Information Services

   C. Dates of Survey: November 28 and 29, 1973

NASIC is supported by the National Science Foundation under Grant No. GN-37296 and is a Research Program of NSF's Office of Science Information Service.

II Historical Background

The University of California Center for Information Services (CIS) is one of several university-based centers for which the Office of Science Information Service (OSIS) of the National Science Foundation has provided developmental support during the past few years. Activities leading to the development of the CIS began with a Phase I feasibility study in 1966-67, funded by NSF under Grant No. GN-503 and directed by Robert M. Hayes, Director of the University of California Institute of Library Research. This study was concerned with assessment of the potential for implementation and use of a range of mechanized information resources in a decentralized university environment.

A multi-participant program evolved from this study, and planning for Phase II design and implementation activities, Phase III development, and Phase IV operation of services called for an orderly transition of responsibility from the Institute (for initial design responsibility) to the Campus Computing Network (for completion of design and development of operational software) and finally to the University Library (to be responsible for the ongoing service capability). Development activities performed under subsequent phases have been supported by the Foundation under Grant No. GN-827. In 1971 CIS initiated provision of experimental services through the several interested UCLA libraries. These experimental off-line services employing the CA Condensates data base were initially provided to the Department of Chemistry.

CIS solicited the cooperation of appropriate subject-oriented branch libraries and trained reference staff members to serve as the user interface and to develop search profiles. This training program commenced in the Chemistry

Library and the Biomedical Library. The enthusiasm of these librarians led to a substantial increase in the use of the services. The experimental services were then expanded by adding the CAIN data base, formerly at the UC Davis campus, into the CIS. The services have continued to expand to serve other campuses within the UC system and other universities.

At the time of the survey the CIS activities associated with Phase IV, involving formal transfer of the CIS project from the Campus Computing Network (CCN) and the UCLA Library to the University of California University-wide Library Automation Program for administration and continuing budget support, had reached the final planning stage with actual transfer scheduled to occur at the end of the present grant period in mid-1974.

Administrative and technical responsibility for the CIS program since its initiation has been shared by several UCLA personnel including:

1. Professor Robert Hayes, in his capacity as Director of the ILR, served as the original Principal Investigator for the program during Phase I and guided the pre-grant activities associated with identification of the need for services, development of the justification for the overall program, and preparation of the original proposal to the Foundation;
2. Professor William Kehl, Director of the CCN, served as co-Principal Investigator during Phase II and Phase III and provided technical direction during software development and implementation;
3. Robert Vosper, University Librarian and co-Principal Investigator during Phases II and III, established the University of California Library Council Subcommittee on CIS thus laying the groundwork for the eventual transaction to a state-wide University activity; and

4. Paul Miles, Associate University Librarian for Technical Services, now serves as Principal Investigator for CIS as the program evolves into a library operation during Phase IV.

The CIS processing system has been designed to support large volume search operations in a batch mode with an interactive profile entry and modification capability.

III Management and Organization

On July 1, 1973, Paul Miles, Associate University Librarian for Technical Services assumed the Principal Investigator responsibility. Within the library, the CIS section is headed by Peter G. Watson. The Campus Computing Network continues to provide technical support to the CIS, and this activity within the CCN is managed by R. Bruce Briggs. It is planned that effective July 1, 1974, administration activities for CIS will be transferred to the University-wide Library Automation Program (ULAP) located at UC Berkeley with Jay Cunningham, Director of ULAP, assuming the policy-making role with the advice of the UC Library Council. However, CIS operations will physically remain on the UCLA campus as a branch of ULAP, with a separate facility manager responsible for administration of the service. It is planned that computer support will be obtained from the CCN, although that entire aspect of the operation is under review.

A Management Committee composed of Briggs and Tony Hall, Head of the Library Systems Department, serves in an advisory capacity to the Principal Investigator.

The UC Library Council, composed of the nine University Librarians, serves to advise the Academic Vice President of the state-wide University of California System on broad issues and general policy matters concerning the several libraries. A subcommittee within this Council provides guidance on policy matters specific to the CIS. It was at the suggestion of the Library Council that the decision

was made by the Academic Vice President to incorporate the CIS into the University-wide Library Automation Program.

Data base acquisitions decisions for the CIS are made by the CIS project staff with the advice of a CIS Liaison Committee composed of the Principal Investigator, the Directors of the branch libraries, Kehl and Briggs from CCN and representation from the central administration of the University Library. There are no formal criteria for data base selection.

At the time of the survey the CIS program staff approximated 14 persons including the Principal Investigator. The CIS Section in the Library employed 4.5 FTE's (Section Head, 2.5 FTE Librarians and a research assistant). The CIS Section within the CCN employed 9 FTE's (Project Manager and 8 programmers). Post-grant operations of CIS will be supported from the University System budget through the University-wide Library Automation Program.

IV. Service Center Operations

A. Services Provided

CIS offers current awareness searches on 5 data bases: BIOSIS (BA and BRI), CA-Condensates, CAIN, COMPENDEX, and ERIC. (Note: Since the time of the survey, CIS has added current awareness searching on a sixth data base, the ISI Social Sciences Citation Index.) Regularly scheduled retrospective searches were first introduced in January 1974. CIS is presently negotiating for back files of all data bases. Retrospective searching had previously been offered on an ad-hoc basis with the partial files available.

The CIS staff indicated intentions to discontinue use of the COMPENDEX data base as of December 1973 due to: 1) low demand, 2) problems with delivery and quality, and 3) relatively high cost for the data base. In 1974 CIS initiated a subscription to the ISI Social Science Citation file and, through a resource

sharing arrangement with the Georgia Information Dissemination Center (GIDC), expects to be able to continue to provide searching on the engineering data base. In exchange GIDC may use CIS for access to the social science data base.

The University Library also offers a limited numerical data bank service using the 1970 census data. Tapes and software are from DUALabs. A member of the library staff, familiar with the data base and the available programs, serves as the data base specialist. The CCN programming staff is available for advice but the user has to arrange his own runs and perform his own programming. Users not able to program can go to the Campus Survey Research Center which charges a fee for programming services. Many users who have requested census service have had access to their own programming support staff.

A census search facility had previously operated out of the UC Berkeley campus, operating as an on-demand census reporting service on a fee-for-service basis. This facility was closed, apparently due to insufficient cash flow. Several non-census numerical data banks exist at UCLA but they are not now under University Library control.

Document delivery services are presently under investigation by the staff of the Institute of Library Research at UC Berkeley. The CIS staff expressed a feeling that the need for document delivery is growing throughout the University system, but it is recognized that an effective service would require staff not presently available. The issue of document delivery has now been raised at state-wide levels for the University of California and the California State University and College System as a result of the study being done at the ILR.

B. User Interface

The Information Processing System (IPS) software developed for CIS has many of the same capabilities as the profile input and update system employed at the University of Georgia. IPS allows interactive profile entry and modification with on-line diagnostic capabilities through terminals presently located at UCLA and the ILR at Berkeley. As of April 1974 it is planned that the system will eventually accommodate on-line search strategy preparation and refinement using a sample data base.

Assistance to users is now usually provided through a profile analyst resident in one of the local libraries. Some users prefer to construct their own profiles, but CIS experience suggests that this practice actually increases the amount of CIS staff involvement in trying to solve profile problems from long distance. Recognition of the importance of the user interface in achieving effective man/system interaction has led UCLA to join with the University of Georgia in submitting a proposal to the National Science Foundation to study this interface and to develop models of those aspects amenable to automation. (Note: this proposal has been funded since the time of the survey, and the project is now under way.)

C. Search Strategy Design

CIS uses a profile identification form and a "Statement of Interest" form to allow the user to define his area of interest for either current awareness or retrospective searching purposes. A user/analyst conference usually precedes the coding activity. If the user is not readily available for a face-to-face interview, the specialist will try to contact the user via telephone prior to coding the profile. Coding of profiles averages about one hour, with a range from as little as one-half hour to as long as four hours. The time requirement

for each profile is a function of the familiarity of the analyst with the data base, availability of vocabulary aids, dependence on past relevant articles and printed indices, and specificity of the user request.

If the analyst has a terminal, the profile can be entered directly. Since few locations actually are equipped with terminals, many profiles are routed to UCLA for input by the CIS staff. Keyboard entry and related processing averages 20 to 30 minutes. At present vocabulary aids to assist in interactive profile development are not available, so analysts are still dependent on printed aids.

New profiles are entered daily and run through a batch diagnostic routine, on-line diagnostics not being available at the present. Search output from new profiles is sent directly to the analyst for review. CIS operational policy deemphasizes routine review of profiles with users and limits such conferences to those situations where profile restructuring is deemed necessary. Several analysts reported that this limitation on personal interaction between user and analyst made it difficult to interpret the user problem. For example, written statements such as, "I am interested in _____ and especially interested in _____" are ambiguous. The common inaccurate use of "and" and "or" logic also causes problems.

D. Promotion and Marketing of Services

Very little programmatic emphasis has been given to the formal promoting of the experimental CIS services throughout the University system. Marketing activities have been selective and low key. At the Los Angeles, Berkeley, Riverside and Davis campuses, word-of-mouth is now the primary advertising mechanism. Previously the Library Directors had sent out letters to faculty, the only group to receive a blanket mailing. Information about CIS is available at

the reference desks in participating campus libraries, but it is not always publicly displayed. Seminars have been given at several California State University and College System campuses and at Stanford where the local library staff handles promotion. CIS plans to intensify its promotion through a series of one-day workshops and follow-up activities at the various libraries of the University of California and the California State University and College System.

As of the date of the survey, CIS services were being introduced to the San Diego and Irvine campuses. At the Santa Barbara and Santa Cruz campuses staffing problems have delayed the provision of the experimental services. With the planned imposition of use charges as of January 1974 for non-UC users, it is expected that additional promotional activities will be necessary in the near future to build up the demand for services on a fee basis.

E. Information Specialist Training

The training activities for the initial group of libraries in 1969 and 1970 consisted of a series of two 2-hour sessions per week for a 10 week period. It covered generalities of information systems, data bases, acquisition and cataloging. The content was intended more to bring the librarians up to date in these general areas than specifically to train them as analysts. The present training program consists of a one-day workshop covering the following areas:

1. Explanation of CIS (1-2 hours)
2. How to write profiles (creating a profile from a prose statement)
3. IPS language fundamentals
   a) Basics
   b) Sophisticated features
   c) Weighting
4. Procedures
   a) Forms
   b) Ideas on getting started

Items 2 through 4 take about four hours. The workshop agenda is coincident with the CIS "Guide for Preparing IPS Profiles." Follow-up after the seminar often occurs by phone. Trainees are encouraged to prepare a profile of their own research interests or of a common reference question. In actual practice it usually takes about five profiles and about three phone calls to train analysts to feel comfortable in assuming the profile development responsibilities.

CIS is planning to institute a two-day workshop session later in the program in order to allow more controlled practice sessions as a means toward confidence level improvement.

F. Processing Center Activity

From its inception through the date of the survey, CIS had processed over 2500 current awareness searches for approximately 1000 users. Since services available at the time of the survey were considered largely experimental and evaluation of the system was continuing, hard data representing dollar amounts of operational costs were not available.

V Services Usage

The distribution of use of the CIS bibliographic search services based on statistics compiled through October of 1973 is shown below:

UCLA usage	- 60%
other UC System usage	- 20%
other institutional usage	- 15%
commercial usage	- 5%

Although there have been no formal studies by the CIS staff to measure the effect of CIS services on the traditional library services, the general reaction of the library staff suggested that academic users of CIS services now make more productive use of the library facilities. Precision in searching has been averaging 50% to 60% and recall has been considered adequate.

Expansion of the CIS capability throughout the University system has been progressing at a somewhat slower rate than originally planned as the full extent of support required for the CIS operation became recognized. Although full support of the library administration has been a factor in progress to date, the libraries have been able to cooperate only on short range experiments due to the lack of budget support. Some temporary funds have been made available by the CIS project for operational start-up, but there are no permanent new moneys in the library budget as yet and no permanent staff has been assigned to provide these services. At the time of the survey it was reported that one library had already been forced to reduce the level of CIS services provided due to inadequate funds to support sufficient staff involvement.

VI Processing System Characteristics

A. Information System Description

CIS had used the IBM TEXT-PAC software for a few year until mid-1973 when its own IPS system was sufficiently developed. All searches are now run on IPS, which has been designed to provide a range of search services from a multiplicity of data bases with both batch processing and interactive search options. IPS has no internal data base format for current awareness services. External files are processed through an interface of control blocks and program modules. There is one external file descriptor for each access method. There is one format file descriptor for each interchange format. (This operation is to become table-driven.) Retrospective files will not be put into an inverted file until more storage is available.

IPS profiles can run across more than a single data base (but charges will be per data base). The software tries to minimize the efects of fields named in the IN statement which may be missing from some data bases. (TEXT-PAC did

not permit application of one profile to more than one data base.) At present, lack of sufficient storage prevents use of IPS for full on-line searching.

B. Hardware Configuration

The CIS searches are processed in a batch mode on an IBM 360/91 computer configuration operated by the Campus Computing Network at UCLA. There is an interactive profile entry and modification system available. The computer may be accessed through a number of batch and remote entry systems including ARPA and direct dial. CIS is not on Tymshare.

C. Software

The operating system at the time of the survey was IBM OS, MVT with TSO. The major programs are written primarily in a 360 assembler language.

D. Operational Environment

Searches are processed in a batch mode on the third shift. Current awareness searches are usually run concurrently with the receipt of update tapes. Processing against an update tape and all preparations for distribution is completed within 2 to 3 days after receipt. CCN has no backlog. The retrospective search schedule is under review and may be similar to the two-week cycle of the GIDC at Georgia.

VII Survey Participants

For their several contributions to this survey effort the NASIC staff expresses its appreciation to the following members of the University of California System:

Page Ackerman	University Librarian, UCLA
Charles P. Bourne	Director, Institute of Library Research, UC Berkeley
R. Bruce Briggs	CIS Project Manager for the Campus Computing Network, UCLA
Jay Cunningham	Director, University-wide Library Automation Program

William B. Kehl	Director, Campus Computing Network, UCLA
Paul Miles	Associate University Librarian for Technical Services, UCLA
Peter G. Watson	Head, CIS Section, University Library, UCLA

and other staff members of the CIS and the UCLA University Library.

SUMMARY REPORT OF

A NASIC SURVEY OF MACHINE-READABLE DATA BASES

Their Administration, Services and Uses on University Campuses

I. General Information

A. Institution Surveyed:

University of Florida

Gainesville, Florida 32601

B. Resident Information System/Center Name:

Information for Campus, Community and Commerce Program

Agricultural Information System

Medline

C. Dates of Survey: December 12 and 13, 1973

NASIC is supported by the National Science Foundation under Grant No. GN-37296 and is a Research Program of NSF's Office of Science Information Service.

II Historical Background

The survey, performed by the NASIC staff at the University of Florida in Gainesville, provided information on a wide range of computer-based information service activities presently in operation on that campus. While all the projects and services discussed are of general interest, for the purposes of this survey we have limited our report to the four services supplied through the Information for Campus, Community and Commerce (ICCC) program of the University Libraries or through other library facilities. These services are:

The Census Access Program (CAP)

Agricultural Information System (AIS)

Medline

Bibliographic services from other centers

In 1969, Dr. Gustave Harrer came to the University as Director of Libraries with a strong commitment towards effective implementation of machine-readable data services within the library. Dr. Harrer views digital storage as a medium for the storage of information which just as logically belongs in libraries as the more traditional forms. Not unexpectedly the impetus for the development of computer-based information services for the university community was initiated by Dr. Harrer

The ICCC program was established by the University of Florida Libraries in 1970 to provide computer-processed information services as an extension of traditional library services. An integral part of the University Libraries, operations of the ICCC are located in the Main Library complex. Programming support and technical assistance is provided by the Library Systems and Data Processing Group.

III Management and Organization

Realizing that it was essential to mesh the computer utilization with internal library processes, Dr. Harrer set about to build the necessary data processing staff capability within his library organization. After some early experimentation with the MARC data base, the Library Systems organization headed by Mr. Robin A. C. Fearn, Assistant Director for Systems, undertook the development of the census-related services as a first step in implementation of automated library services.

All funding for the development and operation of the services provided through the ICCC program was derived from the library budget and user charges. No outside funding sources have been used. Library funds for the University System are allocated by the State Legislature and distributed among the individual campuses utilizing a modification of the "Washington Formula". One deficiency in this allocation scheme is the lack of a budgetary consideration for library use of computer services.

The ICCC staff at the time of the survey numbered 14 people including the coordinator, a social science information specialist, a science and technology information specialist, specialist/computer programmers (5), a data processing coordinator plus a supporting staff of librarians, data processing and clerical personnel.

IV Service Center Operations

A: Services Provided by ICCC Program

The Information for Campus, Community and Commerce (ICCC) program provides both bibliographic and numerical data processing services as discussed below:

1. The Census Access Program (CAP)

The CAP program represented the initial entry of the library into provision of automated services. The census services are treated as an

amplification of regular reference activities and accordingly are provided by four staff members in the Reference Department. Programming for the census service is performed by the library systems group. The Computer Center performs the tape processing function.

The program started as a cooperative activity among the nine state universities of Florida under a START-1 membership with DUALabs. The heavy demand for services at the Gainesville campus provided justification for the University to apply for full membership. It was originally intended that census activities would be limited to the eastern half of the country with UCLA assuming responsibility for the area west of the Mississippi River. This cooperative venture did not materialize, however, and the University undertook private programs which allowed the purchase of data covering the entire country.

With the University of Florida assuming a national census clearinghouse status and with the concomitant increase in census data services, the level of expertise of the staff has improved significantly. The census staff now serves a broadened user community with divergent interests. User interviews average 45 minutes and range from a few minutes with more experienced users to one and one-half hours for discussions with new users. Approximately one request per week requires new programming. It is noteworthy that user requests are becoming more complex as users gain more experience with the capabilities of the data base.

Demand patterns are also changing. At the start of the service approximately 80% of the requests were received from medium and large business firms and planning agencies. Then came an influx of requests from federal agencies. Currently, academic researchers and smaller consulting firms are the heavy users. The larger organizations continue to participate but are now requesting

refinement of previously developed data or smaller amounts of new data. About 25% of the academic users are students. Often an entire class engages in a census-related project at reduced cost (approximately $10 per student).

The quality of service demanded seems to vary significantly between the academic and the industrial users. Experience suggests that academic users have a tendency to state their needs in a somewhat undefined manner. Thus the academic user is usually satisfied with a massive printout of complex data which can be analyzed as the question is refined. At the other extreme, most industrial users request a more sophisticated response, packaged in a manner capable of presentation either to management or client. The CAP program provides services on a graduated fee-for-use basis, with government agencies and commercial firms respectively paying 1.5 and 2.0 times the academic rate. The pricing algorithm does not include all costs, so the library budget actually subsidizes part of the cost to the user, particularly in the case of the academic user.

2. Service Provided Through Other Centers

Bibliographic data base services are provided to University users through cooperative agreements with the North Carolina Science and Technology Research Center (NC/STRC), the University of Georgia Information Dissemination Center (GIDC), the University of Pittsburgh Campus Based Information Service (CBIS) and the NASA regional dissemination center at Indiana University (ARAC). The University had previously attempted local implementation of the ERIC, SPIN and MARC data base services using internally developed software but decided to discontinue this effort due to high cost and availability of suitable services elsewhere.

a) NC/STRC Services

The Engineering and Physical Sciences Library coordinates all bibliographic searching processed by the NC/STRC. Search strategy development is performed by the Engineering Librarian in concert with the user. The user is required to use the several search aids in order to select search terminology prior to discussion with the librarian. Retrospective services are provided by NC/STRC to the University of Florida users on a fee-for-service basis billed directly to the individual user.

Search services for students are provided at special rates ($15 for first data base, $10 for subsequent data base used per same search). NC/STRC usually limits these special services to 30 searches per institution but the University of Florida level of usage (usually in excess of 60 users/year) is accommodated by the lower usage at other institutions participating with the NC/STRC. Results are normally received within 10 days of the request. Search services for department or faculty members are provided at regular rates. Promotion of these services at the University of Florida has involved some direct mailing as well as brochure distribution at the Library.

The output from NC/STRC is limited to 300 abstracts per data base searched except for ERIC searches where a limit of 100 (e.g., 50-RIE, 50-CIJE) is observed. Citations in excess of 300 are billed at the rate of $.10 per abstract. Documents are provided at cost. All output is stripped of NC/STRC identification before delivery to the user.

b) GIDC Services

The University of Florida provides searching through the GIDC on a fee-for-use basis as a service to the state. The University is currently working with ten Florida-based industrial organizations and three out-of-state organizations. Profiles are prepared by the ICCC staff. At the time of the

survey there were nine SDI profiles active at the GIDC. Output received from GIDC is also stripped of processor identification before delivery to the user. (Note: by spring of 1974, the utilization of services from GIDC had been terminated.)

3. On-line Service Capability

The ICCC operation expects to add an on-line access capability in mid-1974. Facilities to access the System Development Corporation (SDC) services will be implemented. Staff training will be scheduled during the spring and summer sessions. The ICCC proposes to charge a fixed fee for most on-line search services and off-line printouts of $25.00 per search (up to one-half hour) for academic users, $37.50 for government users and $50.00 for industrial users. The University of Florida has proposed to the University System that the service capability provided through the Library ICCC program be considered as a state resource and possibly funded separately as a state or regional center for bibliographic services.

B. Services Provided through Departmental Libraries

Specialized bibliographic search services, provided by the Agricultural Library and the Health Center Library, are discussed below:

1. Agricultural Information System (AIS)

The AIS program provides free SDI services from the CAIN data base through the Agricultural Library at the University of Florida. The Agricultural Library operates semi-independently of the University of Florida Library System. The CAIN tapes are processed by the main libraries' ICCC group at the campus computing center. The costs for acquisition and processing are supported from the Agricultural Library and main libraries' budgets to the limit of approximately 200 profiles per year.

The AIS service is provided on a state-wide basis and quite frequently requires the library personnel to travel to the several experimental USDA Stations for discussion with the users. The CAIN profiles are developed by Agricultural Library personnel after a reference interview usually averaging 40 minutes in duration. Profile revision is kept to a minimum.

CAIN searching is limited by the University of Florida Computation Center software to words from titles, author and NAL class number. There is a 300 word stop list. Truncation and stem-search capability have not yet been implemented. Output is limited to 300 citations for non-University users. Use outside of the university is charged at a rate of $60.00 per year and ten cents per citation for all citations exceeding the limit. No retrieval restrictions have been placed on university users.

The Agricultural Library reports some increase in interlibrary loan requests from users at the several agriculture stations. Free photocopy service is provided to the USDA staff. To accomodate hard copy delivery the library prepares two copies of all output, holding one and sending the other to the user. The user can then order hard copy by simply referring to the appropriate search order number; the library staff uses the hold copy of the search as a document retrieval check list.

An inverted file has been prepared for retrospective searching but, as of the date of the survey, few retrospective searches had been performed. The computer center is reconsidering the need for continued maintenance of this file, particularly in light of the fact that a retrospective search capability is planned for implementation in early 1974, utilizing the on-line data base services provided by SDC. CAIN services will be provided by the Agricultural Library at a fixed rate of $25.00 per half hour of connect time and $1.00 per minute beyond that time.

2. Medline

The Medline search service is provided by two members of the reference staff at the University of Florida Health Science Library, one of whom was trained at the National Library of Medicine in Bethesda, Maryland. This Library also provides SDI service through Automatic Subject Citation Alert (ASCA) program of the Institute for Scientific Information (ISI). Both services are operated on a fee-for-use basis. Faculty and authorized graduate students can charge against departmental accounts; others (about 10% of the total number of users) must pay by cash or check at the time of request. Charges are not levied for staff assistance or off-line printouts from Medline. ASCA users secure hard copy through the ISI "OATS" service.

Medline usage averages 85 requests per month. Twelve users subscribe to a current awareness service operated by the library at a cost of $30 per year, in which the library staff runs an on-line search each month against a fixed search profile.

In the first year, the ASCA service was subsidized by the University, which absorbed the first $35.00 of profile costs. The subsidized search program attracted 42 users. The subsidy was dropped in the second year and the number of users declined to 25. When the processor raised the minimum fee for service to $75.00 a further reduction to 14 users occurred. With the introduction of Medline services, an additional decline in ASCA use was observed.

The typical Medline search requires approximately 20 minutes of user-specialist interaction to develop the strategy, followed by on-line connection averaging 10 minutes. A few users can access the system without the intermediary. The majority of users arrive at the library without a written problem statement. In order to expedite the search process, these users are provided with the "INDEX MEDICUS" and requested to familiarize themselves with the data base indexing terminology.

Publicity about Medline on the main campus has been limited. A 25 minute slide-tape self teaching program for Medline, available from the College of Dentistry, covers the history, search statement construction, terminal use, and project use of the information service. In addition, special courses in drug information retrieval are available to graduate students majoring in pharmacy. Several demonstrations of Medline have been given by the Health Center staff.

V Processing System Characteristics

The CAIN data base is processed on an IBM 370/165, located in one of several regional centers established for the administrative processing needs of the University. The local Computation Center does not take any responsibility for the promoting of information retrieval activities although it has announced the availability of such services in a newsletter. The Computation Center itself has not received any requests for the provision of additional bibliographic information services, nor has it attempted to integrate the existing information activities scattered around the campus.

The Center supports various information retrieval packages such as BIRS, MARK IV, and several statistical packages. The Center, in concert with the Library, previously tested Burroughs, MARK IV and others, but found them to be too generalized or too expensive for use in search and retrieval. Text Pac is expected to be added before September 1974.

VI Survey Participants

For their several contributions to this survey effort, the NASIC staff extends its appreciation to the following members of the University of Florida community:

Robert A. Bryan	Associate Vice President for Academic Affairs
Gustave A. Harrer	Director of Libraries

Robin A. C. Fearn	Asst. Director of Libraries, Systems
Annette Liles	Chairman, Reference Department
Ray Jones	Reference Department
Roger V. Krumm	Engineering and Physical Sciences Librarian
Albert C. Strickland	Agricultural Librarian
Charles Schaffer	Director, Computation Center

and other staff members from the Library, the Computation Center and the general University community.

SUMMARY REPORT OF

A NASIC SURVEY OF MACHINE-READABLE DATA BASES

Their Administration, Services and Uses on University Campuses

1. General Information

   A. Institution Surveyed:

      North Carolina Board of Science and Technology

      Research Triangle Park, North Carolina 27709

   B. Resident Information System/Center Name:

      North Carolina Science and Technology Research Center (NC/STRC)

   C. Date of Survey: December 14, 1973

NASIC is supported by the National Science Foundation under Grant No. GN-37296 and is a Research Program of NSF's Office of Science Information Service.

II. HISTORICAL BACKGROUND

The North Carolina Board of Science and Technology was established by the state in 1963 in order to provide a means to attract high technology industries into North Carolina. The Board is composed of two representatives from each of three universities (Duke University, University of North Carolina and North Carolina State University), two from quasi state agencies, three from the state legislature, three from industrial research organizations and one from the Research Triangle Institute, a non-profit research institute. The same year, the North Carolina Science and Technology Research Center (NC/STRC) was created as a program of the board with the mission of supporting scientific and engineering activities for the benefit of the state. NC/STRC uses the computational facilities of the North Carolina Triangle Universities Computation Center (TUCC), which is located in the same building.

NC/STRC is also one of a number of Regional Dissemination Centers (RDC) established by the Office of Industry Affairs and Technology Utilization, U.S. National Aeronautics and Space Administration, to study and effect the transfer of space technology. NC/STRC, however, differs from its sister centers in that it is not located on the campus of or directly affiliated with a single institution of higher education.

The original proposal for operation of the center as an information processor was submitted to NASA in 1963. This proposal was developed by a consortium consisting of the three universities, the Research Triangle Institute and NC/STRC, all of which pledged support for the proposed Center. In June 1964 negotiations were completed with NASA, and NC/STRC started activities as a Regional Dissemination Center. During the next year and a half, services were

offered to industries in North Carolina and the neighboring southeastern states at no cost. In 1966 NC/STRC instituted the present policy of charging users for the direct cost of services.

III. MANAGEMENT AND ORGANIZATION

The Board of Science and Technology is chaired by the Governor of the State of North Carolina, with Peter J. Chenery, the Director of NC/STRC, also serving as Director of the Board. Center policy is formulated by the Board, subject to NASA concurrence. Day-to-day operation of the center is left primarily to the Director.

Prior to 1971, the budget of the center had been prepared by the Director for Board approval and subsequent submittal to the Legislature. In 1971, however, the operational activities of the Center were placed under the aegis of the Department of Natural and Economic Resources of the state. Since that time, budgets have been submitted through the normal channels of the Department.

A budget approaching $450,000 has been projected for NC/STRC operation in fiscal 1974. The bulk (75%) of the NC/STRC operational costs is supported on a 50-50 basis by NASA and the state; the remaining 25% is realized from user charges. The pricing algorithm for service costs does not presently include elements for recovery of the cost associated with certain of the overhead activities such as administration, marketing, data base leasing or file maintenance. It is recognized and accepted that a realistic projection of sales volume for the foreseeable future indicates that user service charges will not allow for full recovery of operational costs. Thus NC/STRC will continue to depend heavily on support from NASA and state sources.

The Center employs a staff of approximately 25 FTE's. The positions include the Director, a business manager, marketing representatives (2), publi-

cations staff (1 FTE), computer operations staff (2), applications engineers (5) and clerical and support staff (13 FTE's).

IV. SERVICE CENTER OPERATIONS

A. Services Provided

As of the date of the survey, NC/STRC was serving in excess of 2000 users per year with retrospective searching available from the several data bases listed below. Current awareness searching is also provided on those data bases marked with an asterisk.

* National Aeronautics and Space Administration (NASA)
* U. S. Government Reports Announcements (GRA)
* Engineering Index (EI)
* American Society for Metals (ASM)
* Educational Resources Information Center (ERIC)
* Chemical Abstracts Condensates (CAC)

  Infrared Spectral Information System (ISIS)
* Institute of Textile Technology (ITT)
* World Textile Abstracts (WTA)

  MIT Textile Information System (MIT)
* Biosciences Information Service (BIOSIS)

  IFI Comprehensive Data Base of Patents

  MEDLINE

  Smithsonian Science Information Exchange (SSIE)
* Food Science and Technology Abstracts (FSTA)

Of these data bases, NC/STRC actually processes NASA, GRA, ERIC, ITT, WTA, ISIS, MIT and FSTA. The others are made available through cooperative agreements with its sister RDC centers (e.g., EI services are provided by ARAC, CAC by KASC)

and others. The Infrared Spectral Information System (ISIS) is provided through a license agreement with the R. J. Reynolds Company, which underwrote the cost of programming.

Document delivery services are made available at cost from in-house NASA microfilm files, through use of the three university libraries for journal articles and similar literature, through NTIS services and through interlibrary loan arrangements with several specialized libraries (e.g. American Institute of Aeronautics and Astronautics).

B. User Interface and Search Strategy Design

Three types of batch processing search services are provided through the NC/STRC, each tailored to a specific class of user. Full service users are those industrial and academic users who are charged on a direct cost for services basis. Several full time applications engineers interact with these users to define questions, to prepare search strategies and to evaluate the results of the retrieval process. These users receive the output in book-form packages.

Wholesale users are those other information centers which have cooperative arrangements with NC/STRC. These centers usually prepare and submit an acceptable search strategy and provide term posting statistics. Because this decreases the effort required of NC/STRC staff, charges to these users are limited to costs for files accessed, terms searched, output supplied (e.g., abstracts, citations, accession numbers) and delivery charges. Extra charges are usually made for strategy review, profile revision and for profiles which in the opinion of NC/STRC staff produce excessive hits on a regular basis.

The third class of users includes those who participate in the University Library Program of NC/STRC. Introduced in 1967, this marketing oriented program involves the participation of 35 institutions in the Southeast that use the academic library to introduce graduate students to machine searching. Library staff personnel are trained by the NC/STRC to develop search profiles for searching of the NASA, GRA, ERIC and ITT files. The general procedure followed in this program requires the student to develop the initial draft of the search logic. The librarian then reviews the strategy, revises it if necessary and sends the search profile to NC/STRC. All profiles are reviewed again by NC/STRC staff and corrections made if deemed in the best interest of the requester. Results are mailed directly to the user. The charges for these searches are quite low and are borne either by the user or the University, depending on local arrangements.

Current awareness searches are performed by coding the profile so that only those documents on the most recent tapes will be retrieved. Each search question is considered a "job" and a job number is assigned to each profile. In the preparation of a profile each search term is truncated at 30 characters, but no other kind of truncation is available. Up to 30 logical groups of 75 terms each can be entered. The analyst assigns a number to each search term and it can be referenced any number of times in the search equations. Boolean AND, OR, and NOT are used, in that order of precedence. A logical group is defined by parentheses and AND/OR may both appear within it. Groups themselves can be logically linked, but negation can occur only before the last logical group. The maximum number of postings retrieval per logical group is 54,000. The maximum number of accumulated hits during a search is also 54,000. Hits from a search can be saved and used later in a subsequent search strategy.

The engineer search analysts also manually look up and record postings, using these statistics to predict hits.

C. Promotion and Marketing of Services

NC/STRC has carried on an active and successful marketing program within the academic and industrial communities of the Southeast. Realizing early that much of industry has only limited need for new technology and for substantial quantities of scientific and technical information, NC/STRC has concentrated on promotion of search services to those segments of industry which are heavily dependent on research and development (e.g., chemical and plastics industries). NC/STRC currently employs two full time marketing representatives to promote search service accounts in the commercial sector. The marketing activities of the NC/STRC accounts for approximately 20% of the center's labor budget.

Approaches which have been used to promote the use of NC/STRC services by industrial organizations range from mass mailings of brochures to speaking engagements before technical and professional societies. A satisfactory center-user relationship is, however, usually achieved only after a series of dialogues between NC/STRC representatives and potential users has developed confidence in the NC/STRC expertise and a firm understanding of the capabilities and limitations of the machine search operation.

In contrast, marketing to academic researchers usually requires a less intense but equally persuasive campaign. Low cost subsidized searches are offered to graduate students through the University Library Program, in an effort to demonstrate to both students and their faculty advisers the benefit of machine searching. Publicity aids are supplied to the libraries, articles are prepared for local bulletins and occasionally members of the NC/STRC staff visit the campus to speak to faculty groups and departments.

D. Information Specialist Training

The staff information specialists are expected to have at least a Master's degree in a subject discipline. NC/STRC prefers to employ engineers or scientists with two to five years of industrial experience as search specialists. The training program for the staff specialist involves several days of on-the-job training in concert with an experienced analyst followed by approximately six months of developing profiles with frequent quality control checks by other specialists. Training of the librarians who participate in the University Library Program originally consisted of a two-day session at the Center. This course has now been modified so that the training can occur at the local campus. Under the present scheme, the entire reference staff can, in several hours, be adequately briefed to assist users in the development of generalized profiles.

The training program covers the following topics:

Data bases	- 30 minutes
Questioning techniques	- 15 minutes
Search aids	- 30 minutes
Boolean logic	- 15 minutes
Review of typical search	- 30 minutes
Set up of a search	- variable

Subsequent training is generally handled by correspondence, although NC/STRC sometimes gives refresher courses.

E. Processing Center Activity and Service Usage

The NC/STRC experience suggests that commercial clients prefer retrospective searching on demand rather than current awareness services. A services use report prepared for a one-month period prior to the survey recorded 248 retrospective searches versus 4 SDI searches for 27 profiles.

There were approximately 70 unique SDI profiles active at the time of the survey. The NC/STRC staff is currently averaging between 20 and 30 retrospective search strategies per month per engineer.

During 1973 approximately 252 retrospective searches were processed under the University Library Program. This program has grown from an initial 9 institutions in 1967 to 35 Southeastern universities at the present time. However, all universities do not participate at equal levels since the success of the program on each campus is dependent on the interest of the library in promoting the program. Some libraries prefer a low key program because of fears that excessive involvement might compromise the quality of traditional services.

Current awareness searches are run on the six in-house data bases whenever the current issue or update tapes are received from the supplier. Services from other centers are provided per the schedule established by the respective centers. Frequency of updates vary from weekly to quarterly as shown below:

Frequency of Update	Number of Data Bases
Weekly	1
Semi Monthly	2
Monthly	7
Quarterly	1

Retrospective searching is usually provided on a 24-hour turnaround basis, the computer runs being made the same night that the request is received. Special demand searching options can be accommodated but at increased cost.

Considering the mandate to infuse NASA technology throughout industry, it is not unexpected that 90% of the users of the NC/STRC services are from industrial and commercial organizations. This emphasis on industrial use

has had some effect on the quality of service provided, since the industrial user is more cost-benefit oriented and more demanding. Search output is provided in bound copy form. Either the full catalog record including machine stored abstract is printed out or abstract reproductions are made from printed sources. If the final hit list is being saved, a message key under which the list is stored is also included. In later searches these keys (up to a limit of 30 different keys) can be used to have search logic act on the results of previous searches. All output is reviewed by the staff prior to delivery. NC/STRC is particularly careful in respecting the proprietary rights of the commercial user and guards against accidental distribution of search results to competitors.

Search output provided through the University Library Program is also bound, but not reviewed prior to delivery and limited as to the number of abstracts supplied (100 abstracts for the ERIC data base, 300 abstracts for other data bases). Students can request additional output but additional costs will be levied.

F. Processing Center Operational Costs

Approximately 70% of the budget is labor-related and a third of that is allocated to the engineering staff. Approximately 8% is spent on computer charges. The remaining 22% supports data base-related charges and purchase of other materials and services.

V Processing System Characteristics

Processing of the several in-house data bases is performed at the North Carolina Triangle Universities Computation Center (TUCC) using the Center's IBM 370/165 computer and related facilities. The TUCC system is telecommunications oriented and operates under OS/370 - MVT/HASP.

Data bases processed locally by NC/STRC are accessed through separate inverted files for each data base. The center is one of the few batch processing centers using inverted files. A postings list is generated on computer output microfiche (COM) after every update for each complete file. The inverted file contains descriptors or identifiers, which for data bases with controlled vocabulary consist of whole phrases. For the FSTA data base, NC/STRC also uses title words plus keyword phrases. For the several data bases for which a separate abstract cards file is not available (WTA, MIT, ERIC, NTIS for 1973), all data including any machine-readable abstracts goes into the computer-stored bibliographic file. For those data bases for which hard copy abstract cards are available, the inverted file contains a reference to the manual card file. The center perceives this as a cost effective approach but has published no comparative data about it.

An on-line entry system, using Hazeltine 2000 terminals, is expected to be available about March 1974. The system will be of a "fill-in-the-blank" form. The system will check syntax of input statements. The programming is oriented specifically to the Hazeltine equipment and uses Hazeltine commands. Search questions will be stored on-line for subsequent modifications, but only for a "half-life" time, after which a tape dump will be made.

VI Survey Participants

For their several contributions to this survey effort the NASIC staff extends its appreciation to the following:

Peter J. Chenery	Director, North Carolina Board of Science and Technology, and Director, NC/STRC
Becky Walker	NC/STRC University Coordinator
Mary Ann Furniss	NC/STRC Computer Systems Analyst

NASIC - The Northeast Academic Science Information Center

GUIDE FOR

A SURVEY OF MACHINE READABLE DATA BASES

Their Administration, Services
and Uses on University Campuses

I. General Information

A. Institution Surveyed:

_____

_____

_____

B. Resident Information System/Center Name:

_____

_____

_____

C. Date(s) of Survey: _____

NASIC is supported by the National Science Foundation under Grant No. CN-37296 and is a Research Program of NSF's Office of Science Information Service.

II. Historical Background

Institution: _____

Date of Survey: _____

Information Provided by:

Name	Title	Tel. No.

Interview Conducted by: Org.

_____ _____

_____

_____

_____

II. Historical Background

A. Primary Objectives of Information Services Development Program

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

for additional information see attachments ☐

B. Service Development Justification was based on:

			copy provided
(1)	☐	User needs survey and analysis	☐
(2)	☐	Markey survey and analysis	☐
(3)	☐	Service Operational costs analysis	☐
(4)	☐	Other justification: _____	☐

_____

_____

_____

_____

INSTITUTIONAL OE PARTICIPATING ORGANIZATION	Initial Development Roles										
	Identified the need for specific service(s)	Determined & defined original program objective(s)	Was consulted informally for advice	Developed justification for program	Participated in data base selection	Prepared proposal to funding organization(s)	Administered development program	Provided technical direction (principal investigation)	Was major source(s) for development funding	Others	
University Administration	X	X	X	X	X	X	X	X	X	X	X
Part A (see Note 1)											
Part B (see Note 1)											
Part C (see Note 8)											
University Library	X	X	X	X	X	X	X	X	X	X	X
Part A (see Note 2)											
Part B (see Note 2)											
Computer Center	X	X	X	X	X	X	X	X	X	X	X
Part A (see Note 3)											
Part B (see Note 3)											
State Agencies	X	X	X	X	X	X	X	X	X	X	X
Agency A (see Note 4)											
Agency B (see Note 4)											
University Departments	X	X	X	X	X	X	X	X	X	X	X
Department A (see Note 5)	X	X	X	X	X	X	X	X	X	X	X
Faculty											
Research Staff											
Grad. Students											
Department B (see Note 5)	X	X	X	X	X	X	X	X	X	X	X
Faculty											
Research Staff											
Grad. Students											
External Funding Agency (see Note 6)				X							
Other (see Note 7)											

NOTES

1. University Administration (please identify individuals)

Participant	Title	Name
A)		
B)		
C)		

2. University Library (please identify individuals)

Participant	Title	Name
A)		
B)		

3. Computer Center (please identify individuals)

Participant	Title	Name
A)		
B)		

4. State Agencies (please provide additional information)

Agency

A) Name: _____

Personnel: _____ Title: _____

_____ Title: _____

Why this agency? _____

_____

B) Name: _____

Personnel: _____ Title: _____

_____ Title: _____

Why this agency? _____

_____

5. University Departments (please identify)

Department A: _____

Individual(s) _____ Title: _____

_____ Title: _____

Department B: _____

Individual(s) _____ Title: _____

_____ Title: _____

6. External Funding Agency (please identify)

_____

_____

7. Other (please describe): _____

_____

C. Organizational Involvement in Initial Planning Activities (leading to decision to implement machine readable services)

INSTITUTIONAL OR PARTICIPATING ORGANIZATION	Identified the need for specific service(s)	Determined & defined original service objective(s)	Was consulted informally for advice	Developed justification for program	Participated in data base selection	Prepared proposal to funding organization(s)	Administered development program	Provided technical direction (principal investigation)	Was major source(s) for development funding	Others
University Administration	X	X	X	X	X	X	X	X	X	X
Part A (see Note 1)										
Part B (see Note 1)										
Part C (see Note 8)										
University Library	X	X	X	X	X	X	X	X	X	X
Part A (see Note 2)										
Part B (see Note 2)										
Computer Center	X	X	X	X	X	X	X	X	X	X
Part A (see Note 3)										
Part B (see Note 3)										
State Agencies	X	X	X						X	X
Agency A (see Note 4)										
Agency B (see Note 4)										
University Departments	X	X	X	X	X	X	X	X	X	X
Department A (see Note 5)	X	X	X	X	X	X	X	X	X	X
Faculty										
Research Staff										
Grad. Students										
Department B (see Note 5)	X	X	X	X	X	X	X	X	X	X
Faculty										
Research Staff										
Grad. Students										
External Funding Agency (see Note 6)				X						
Other (see Note 7)										

Participant Title Name

A) _____

B) _____

C) _____

2. University Library (please identify individuals)

Participant Title Name

A) _____

B) _____

3. Computer Center (please identify individuals)

Participant Title Name

A) _____

B) _____

4. State Agencies (please provide additional information)

Agency

A) Name: _____

Personnel: _____ Title: _____

_____ Title: _____

Why this agency? _____

_____

B) Name: _____

Personnel: _____ Title: _____

_____ Title: _____

Why this agency? _____

_____

5. University Departments (please identify)

Department A: _____

Individual(s) _____ Title: _____

_____ Title: _____

Department B: _____

Individual(s) _____ Title: _____

_____ Title: _____

6. External Funding Agency (please identify)

_____

_____

7. Other (please describe): _____

_____

C. Organizational Involvement in Initial Planning Activities (continued)

Additional Information:

D. Development History

(1) Project Start Date: _____

(2) Development Planning Schedule:

Phase	Dates	Title	User Services Available	User Charges (Yes/No)

3. Comments: _____

_____

_____

E. Parent Institution Matching contribution to date toward development

1. Contribution Distribution

Phase/Year	1	2	3	4	5	Total
$ Contribution (x1000)						
Staff Contribution (Man/Years)						

2. Comments: _____

_____

F. Available project documentation (proposal, reports, etc.)

	copy provided (YES/NO)

G. Other Pertinent Historical Background:

III. Current Management and Organization of Information Services Program

Institution: _____

Date of Survey: _____

Information Provided by:

Name	Title	Tel. No.

Interview Conducted by: Org.

_____

_____

_____

_____

III. Current Management and Organization of Information Services Program

A. Is Service Considered Operational? Yes ☐ No ☐

1. Identify present operational services:

_____

_____

_____

_____

_____

_____

_____

_____

2. Describe planned services:

_____

_____

_____

_____

_____

_____

_____

3. Identify discontinued service(s) and reason(s):

_____

_____

_____

_____

_____

INSTITUTIONAL / PARTICIPATING ORGANIZATION	Administration/Management Roles											
	Responsible for overall program administration (personnel, resources, space, etc.)	Responsible for technical direction of program	Responsible for planning of services	Responsible for financial matters (project budget)	Responsible for information processing	Responsible for data base selection	Responsible for software development	Responsible for system & software maintenance	Responsible for promotion & marketing of services	Serves in an advisory capacity	Other
University Administration	X	X	X	X	X	X	X	X	X	X	X
Part A (see Note 1)											
Part B (see Note 1)											
Part C (see Note 8)											
University Library	X	X	X	X	X	X	X	X	X	X	X
Part A (see Note 2)											
Part B (see Note 2)											
Computer Center	X	X	X	X	X	X	X	X	X	X	X
Part A (see Note 3)											
Part B (see Note 3)											
State Agencies	X	X	X	X	X	X	X	X	X	X	X
Agency A (see Note 4)											
Agency B (see Note 4)											
University Departments	X	X	X	X	X	X	X	X	X	X	X
Department A (see Note 5)	X	X	X	X	X	X	X	X	X	X	X
Faculty											
Research Staff											
Grad. Students											
Department B (see Note 5)	X	X	X	X	X	X	X	X	X	X	X
Faculty											
Research Staff											
Grad. Students											
External Funding Agency (see Note 6)											
Other (see Note 7)											

B. Current Administration

INSTITUTIONAL & PARTICIPATING ORGANIZATION	Administration/Management Roles											
	Responsible for overall program administration (personnel, resources, space, etc.)	Responsible for technical direction of program	Responsible for planning of services	Responsible for financial matters (project budget)	Responsible for information processing	Responsible for data base selection	Responsible for software development	Responsible for system & software maintenance	Responsible for promotion & marketing of services	Serves in an advisory capacity	Other
University Administration	X	X	X	X	X	X	X	X	X	X	X
Part A (see Note 1)											
Part B (see Note 1)											
Part C (see Note 9)											
University Library	X	X	X	X	X	X	X	X	X	X	X
Part A (see Note 2)											
Part B (see Note 2)											
Computer Center	X	X	X	X	X	X	X	X	X	X	X
Part A (see Note 3)											
Part B (see Note 3)											
State Agencies	X	X	X	X	X	X	X	X	X	X	X
Agency A (see Note 4)											
Agency B (see Note 4)											
University Departments	X	X	X	X	X	X	X	X	X	X	X
Department A (see Note 5)	X	X	X	X	X	X	X	X	X	X	X
Faculty											
Research Staff											
Grad. Students											
Department B (see Note 5)	X	X	X	X	X	X	X	X	X	X	X
Faculty											
Research Staff											
Grad. Students											
External Funding Agency (see Note 6)											

NOTES

1. University Administration (please identify individuals)

   Participant Title Name

   A) _____

   B) _____

   C) _____

2. University Library (please identify individuals)

   Participant Title Name

   A) _____

   B) _____

3. Computer Center (please identify individuals)

   Participant Title Name

   A) _____

   B) _____

4. State Agencies (please provide additional information)

   Agency

   A) Name: _____

   Personnel: _____ Title: _____

   Title: _____

   Why this agency? _____

   B) Name: _____

   Personnel: _____ Title: _____

   Title: _____

   Why this agency? _____

5. University Departments (please identify)

   Department A: _____

   Individual(s) _____ Title: _____

   Title: _____

   Department B: _____

   Individual(s) _____ Title: _____

   Title: _____

6. External Funding Agency (please identify)

   _____

   _____

C. Financial Support

Organization	Annual operational costs contributed $ or %
University (overhead)	
Library Budget	
Computer Center Budget	
User Charges	
External Funding	[redacted]
Source 1._____	
Source 2._____	
Source 3._____	
Source 4._____	

Time $ ____ or 100%

Please identify external sources of funding contributing toward operational costs.

Source 1. _____

Source 2. _____

Source 3. _____

Source 4. _____

(1) Policy Decision Roles

INSTITUTIONAL ORGANIZATION	Policy Decision Roles					
	Final decision authority	Formulates policy	Serves on policy making body	Serves in advisory capacity in policy matters	Administrates policy decisions	Other
University Administration	X	X	X	X	X	X
Part A (see Note 1)						
Part B (see Note 1						
Part C (see Note 1)						
University Library	X	X	X	X	X	X
Part A (see Note 2)						
Part B (see Note 2						
Computer Center	X	X	X	X	X	X
Part A (see Note 3)						
Part B (see Note 3)						
Faculty Committee	X	X	X	X	X	X
Part A (see Note 4)						
Part B (see Note 4)						
Part C (see Note 4)						
Other: _____						

(2) System Performance Monitoring

User experience feedback ( )
Service operations cost reports ( )
Other: _____

_____

_____

D. Policy Making Criteria

(1) Policy Decision Roles

NOTES

1. University Administration (please identify individuals)

Participant	Title	Name
A)		
B)		
C)		

2. University Library (please identify individuals)

Participant	Title	Name
A)		
B)		

3. Computer Center (please identify individuals)

Participant	Title	Name
A)		
B)		

4. Faculty Committee

Participant	Title	Name
A)		
B)		
C)		

5. Other Policy Decision/Role(s) Comments

_____

_____

_____

_____

_____

_____

E. Organizational Description

(1) Documents to be requested — copy attached

Parent Institution Organization Chart	☐
Library organization chart	☐
Computer center organization chart	☐
Responsible department organization chart	☐

(2) How did the information service organization structure evolve?

_____

_____

_____

_____

_____

_____

_____

_____

_____

IV Services Usage

Institution: _____

Date of Survey: _____

Information Provided by:

Name	Title	Tel. No.

Interview Conducted by:	Org.

IV. Services Usage

A. Current Awareness Services

Bibliographic Date Bases

Available Y☐ N☐

Price per profile per issue

1. _____ _____
2. _____ _____
3. _____ _____
4. _____ _____
5. _____ _____
6. _____ _____
7. _____ _____
8. _____ _____
9. _____ _____
10. _____ _____

Profile preparation costs: _____

Profile Update costs: _____

Other pricing options: _____

_____

_____

Comments: _____

_____

_____

_____

_____

_____

_____

_____

_____

B. Retrospective Search Services

Available Y ☐ N ☐

Bibliographic Data Bases	Price Per Volume	Search Year
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
9. _____	_____	_____
10. _____	_____	_____

Other pricing options: _____

_____

_____

_____

Comments: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

C. Quantitative Data Services

Availble Y ☐ N ☐

Data Bases Available

(1) 1970 Summary Tapes

Counts Available 1, 2, 3, 4, 5, 6.

States Covered_____

_____

_____

(2) Public Use Census Summary Tapes Available Y ☐ N ☐

Describe:_____

_____

_____

_____

(3) Other Substantive Data Bases Employed Available Y ☐ N ☐

Describe:_____

_____

_____

_____

see attached sheet ☐

(4) Service(s) Pricing Schedule

Please Describe Charge Determination Criteria:

_____

_____

_____

_____

Comments:_____

_____

_____

D. Document Delivery Services

Available Y ☐ N ☐

1. Describe processing ctr/library interface: _____

_____

_____

_____

2. Service charges(please describe) _____

_____

_____

E. Impact on traditional library services

Appreciable Effect Y ☐ N ☐

1. Describe effect on allocation of library staff personnel: _____

_____

_____

_____

2. Dexcribe effect on institution/library allocation of financial resources: _____

_____

_____

_____

_____

3. Describe effect on use of library services: _____

_____

_____

_____

_____

_____

_____

F. User Community

No. Of Users	Identify Institutional Dept. or other organization	Services* Used Codes
1.		
2.		
3.		
4.		
5.		
6. see attached list ☐		

* note: Services used code: CA, Retro, other.

Identify departments/disciplines most interested in these services _____

_____

_____

_____

_____

Level of Institutional Users

No. of Faculty Users_____

No. of Undergraduate Users_____

No. of Graduate Users_____

No. Of Research Project Users_____

Other Users_____

Additional comments_____

_____

_____

_____

_____

_____

_____

_____

G. Service Promotion and Marketing

(1) Responsibility of (group, etc.)_____

(2) Size of marketing staff_____

(3) techniques used_____

_____

(4) most successful selling techniques:_____

_____

why:_____

_____

(5) Primary marketing targets:_____

_____

why:_____

_____

(6) Public relations approaches used:_____

_____

_____

copies of documents attached ☐ ← marketing related

(7) % of search income:
from parent institution_____
other academia_____
government_____
industry_____
other_____

(8) Estimated annual cost of marketing effort:_____

_____

(9) Is further expansion of market contemplated? Y☐ N☐

What kind_____

_____

when:_____

_____

Expected Results:_____

_____

(10) Library Role in Services Marketing Y ☐ N ☐
(please describe involvement)_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

H. Operational relationship of Services

(1) To other tape services - same institution_____

_____

(2) To tape services at other institutions_____

_____

(3) Extent of resource sharing_____

_____

_____

_____

_____

_____

V. Processing System Characteristics

Institution: _____

Date of Survey: _____

Information Provided by:

Name	Title	Tel. No.

Interview Conducted by:	Org.

V. Processing System Characteristics

A. Hardware Configuration

Manufacturer (e.g. IBM, Xerox, etc.)_____

System Designation (e.g. 360, Sigma, etc.)_____

Model No. (E.g. 30, 5, etc.)_____

Main Storage Capacity (e.g. 8000 bytes, etc.)_____

Peripherals needed to process data bases (e.g. no. & type of tape drives, disc drives, card/reader/punch, printer, print chains, etc.)_____

_____

_____

_____

_____

System output (e.g. COM, Hardcopy, etc.)_____

_____

_____

_____

Other special system requirements (Universal character set, floating point, etc.) Please describe_____

_____

_____

_____

_____

B. Software configuration

(1) Operating system (e.g. OS, Dos, etc.)_____

_____

_____

_____

(2) Operational Environment (dedicated, partitioned, job mix, etc.)_____

_____

_____

(3) Information System Description (capabilities, features etc.)_____

_____

_____

_____

For additional system description see attachment ☐

(4) Source Language:_____

_____

_____

(5) Mode:_____

_____

(6) Generalized packages used:_____

_____

(7) Software transferability (imported or exportable)_____

_____

_____

_____

(8) Software Documentation:_____

_____

(9) Software prepared by:_____

_____

(10) Software maintenance by:_____

_____

(11) Software availability (pricing/policy etc.)_____

_____

_____

C. Data Base Usage Restrictions

Does present supplier licensing agreements with your organization prevent interinstitutional usage or non-member access to any data base? Y☐ N☐

Other restrictions include_____

_____

_____

_____

D. Data Base Overlap Studies (if any) Available ☐

Please describe studies:_____

_____

_____

_____

E. Tape reliability (frequent problems etc)

Data Base	Supplier	Comments
1._____	_____	_____
2._____	_____	_____
3._____	_____	_____
4._____	_____	_____
5._____	_____	_____

VI Service Center Operations

Institituion: _____

Date of Survey: _____

Information Provided by:

Name	Title	Tel. No.

Interview Conducted by: Org.

_____

_____

_____

_____

VI. Service Center Operations

A. User Interface

(1) Interactive search access mode? Y☐ N☐

(a) terminal locations_____

_____

_____

(2) Batch processing mode?_____

_____

B. User training provided? Y☐ N☐

(1) By whom:_____

(2) Techniques employed

	Y	N
(a) Written documentation	☐	☐
(b) verbal instruction	☐	☐
(c) Demonstration	☐	☐
(d) Scheduled seminars	☐	☐
(e) other	☐	☐

C. User Assistance provided? Y☐ N☐

(1) By whom:_____

(2) level of assistance provided (please describe)

_____

_____

_____

(3) User assistance specialist training (please describe) Y☐ N☐

_____

_____

(4) User assistance specialist qualifications (please describe)_____

_____

D. Search Profile Definition:

	Y	N
(1) On-line software tutorial	☐	☐
(2) Query formation - user prepared w/o assistance	☐	☐
(3) Query formation - specialist assistance	☐	☐

E. Service Center Response Time

(1) Current awareness frequency (please describe)____

_____

(2) Retrospective Searching (receipt of query to mailing of response):_____

_____

_____

F. Data Base Acquisition

(1) Base selection responsibility:_____

(2) Base supplier selection responsibility:_____

(3) Acquisition budget administered by:_____

To what extent are user or potential user unvolved in data base selection?_____

_____

_____

_____

_____

(4) Criteria Used for Data Base Selection:

	Data Base	Justification for Implementation	Contractual Arngmts. Code
1.	_____	_____	
2.	_____	_____	
3.	_____	_____	
4.	_____	_____	
5.	_____	_____	
6.	_____	_____	

7. _____ _____

8. _____ _____

9. _____ _____

10. _____ _____

11. (See attached list) ☐

Note: Contractual arrangements Codes A-lease, B-purchase, D-licensed

(5) Tape library cataloging responsibility: _____

_____

G. Processing Center Activity

(1) Average # of records input/year: _____ *

(2) # of SDI searches/year: _____

(3) Average # of retrieved items per SDI search: ___

(4) # of retrospective searches/yr.: _____

(5) average # of retrieved items/retrospective search: _____

H. Processing Center Operations Cost

(1) Fixed Costs-Annual Total $ _____
Staff Salaries _____
Benefits _____
Computer rental(allocated to search services _____
Space rental(allocated to search services _____
data base storage (if applicable _____
utilities (allocated to search services _____
supplies (allocated search services _____
other: _____

(2) Variable Costs - Input Total $ _____
staff (if not included above) _____
Data Base rental or lease _____
Communication (with suppliers) _____
Suppliers (if not above) _____
other: _____

(3) Variable costs - output Total $ _____
screening requests and checking profiles-labor ___
other staff: _____
quality control - labor _____
communications (with users) _____
supplies(if not above) _____
other

(4) Overhead (allocated to search services) $ _____

* If records input per year per data base is available, please note on separate sheet.

I. Other Processing Centers Used

	Data Base Name Accessed
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____

III. Current Management and Organization of Information Services Program

1. Section III-E

(a) Include the service's organization chart?

2. Section III-D

(a) System Performance Monitoring seems in need of finer breakdown:

User experience feedback ( )
Continuous ( ) or Sample ( )
Method _____
Service operations cost reports ( )
Specify _____
Service operations time reports ( )
Specify _____
Other internal quality controls ( )
Specify _____
Other _____

IV. Services Usage Addendum

1. User Feedback:

Is this solicited?
What is the mechanism(s)?
What is sought?
How is it used?

2. Document Delivery:

Describe, including cost and turnaround time

3. Section IV-A

(a) Include specific line for trial periods, and for other "credits".

4. Section IV-B

(a) Include line for search preparation costs

5. Section IV-C

(a) As a corollary to item (4), perhaps add a specific question on least successful selling techniques.

6. Section IV-H

(a) The relationship to other services only inquires about those to tape services. What about to non-tape or online services.

7. Section V-E

(a) Tape Supplier Reliability?

VI. Service Center Operations Addendum

1. Section VI.

(a) Parts B, D, G, H need space on the form for comments.

VIB.

VID.

VIG.

VIH.

2. Section VI-B

(a) Expand item B2a to account for documentation made available by "desk-copy only" and that for take-home reference, and that for give-away or purchase. Also, need space to write-in a brief description of the kind of documentation.

(b) For oral forms, what is length of time of training, and location.

3. Section VI-D

(a) D1 Should allow space to describe the tutorial.

(b) D2 and D3. Does the user have a choice? Are profiles ever prepared by the specialist alone?

(c) This section omits consideration of the review process of a profile.

4. Billing:

Describe
Frequency
What is itemized?
How are individual searches distinguished?
Terms of payment
Are subscription renewal notifications sent?

5. Errors and Claims:

Describe terms and procedures for handling errors in a search, in output, and in billing.

6. Section VI-G

(a) G3 and G5 are definitely more useful when broken out by data base.
(b) Number of data bases searched per user is important.
(c) Space for other quantified activities readily available.

7. Interactive Formulation and Negotiation:

(cf. VI-A)
Means of access
Types of terminals
Command language
Output formats
Protocols for log-on or log-off
Sample data base characteristics
Search aids available for this mode
Cost

3. Search Output:

Forms available
Formats available
Data elements output
Inclusion of search logic or matching conditions in output?
Can output be addressed to other than an account holder?
Is output reviewed before sending?

9. Search Strategy Development

What thesauri or frequency lists are used by your staff?
What do you make available to users?

10. Search Algorithms

How is retrieval effected?
What options are available?
What are the limitations?

11. Searches

What conditions govern profile modification?
Under what conditions are searches rejected?
If requests are screened, what criteria govern?
What changes are made to a request without user's knowledge?
Must requests be submitted separately for each data base it is to be run against?

NASIC - The Northeast Academic Science Information Center

GUIDE FOR

A SURVEY OF MACHINE READABLE DATA BASES

Their Administration, Services and Uses on University Campuses

I. General Information

A. Institution Surveyed:

_____

_____

_____

B. Resident Information System/Center Name:

_____

_____

_____

C. Date(s) of Survey: _____

D. User: _____

NASIC is supported by the National Science Foundation under Grant No. GN-37296 and is a Research Program of NSF's Office of Science Information Service.

NOTE:

Sections I through VI of the Survey Guide are not included in this packet.

VII. User Interviews

Institution: _____

Date of Survey: _____

Information Provided by:

Respondent	Name	Title	Tel. No.
A			
B			
C			
D			
E			

Interview Conducted by: Org.

_____

_____

_____

_____

_____

Background of Users:	Respondents:				
	A	B	C	D	E
1. Academic degree held and year it was conferred.					
2. Have you authored any publications or given any technical papers within the last three years?					
3. Into which of the following age groups do you fall? (Under 25) (25-29) (30-34) (35-39) (40-44) (45 and over)					
4. Into which user category do you fall? (faculty) (graduate student) (research asst.) (Program director) (other - pls. explain)					

A. Date Base Acquisition

1. To what extent are users or potential users involved in data base selection? _____

B. Introduction to Services

1. How are services generally publicized? _____

2. How were respondents introduced to services?

Respondent "A" _____

Respondent "B" _____

Respondent "C" _____

Respondent "D" _____

Respondent "E" _____

C. User Experiences

1. Have machine-readable information services been used during last year?

Respondent	Services Used		Approx. No. of Searches	Types of Services		
	Yes	No		CA	Retro	Other
A						
B						
C						
D						
E						

2. Do you recall any of the details of your most recent use of computer based information services?

Respondent	Remembers		Access Mode		Respondent Hours Spent-Search Strategy (Estimated)
	Yes	No	On-line	Off-line	
A					
B					
C					
D					
E					

Were you assisted in formulating your request (please describe level of assistance, mode of assistance, e.g., letter, phone, in person; and time devoted to assistance)?

3. Do you recall anything happening during a recent search that made it a better search, or that made the search less satisfactory. For example, what was the most gratifying or irritating thing that happened?

Respondent "A" _____

_____

Respondent "B" _____

_____

Respondent "C" _____

_____

Respondent "D" _____

_____

Respondent "E" _____

_____

4. Which of these statements most nearly describes how urgently you needed the search results when you requested the above search? (Do not comment on the importance of the results when you received them.)

Urgency of Search	Respondents				
	A	B	C	D	E
Very urgent; other work held up. E.g., a search for information on the characteristics of a substance to be used in a current experiment.					
Important; needed to help determine course of future work or to help fill in gaps in your knowledge. E.g., a search for information on the performance of one of a class of possible circuits to be used in a piece of equipment.					
Not very important; completeness of search results had little priority. E.g., a bibliography to be used as supplementary information.					

5. Generally how would you rate the urgency of most of your searches?

Respondent	Very Urgent	Important	Not Very Important
A			
B			
C			
D			
E			

6. Sometimes a search turns up significant information and sometimes it adds little to the researcher's knowledge. Which of these statements most nearly describes how important the results of the above search were?

Results Assessment	Respondents				
	A	B	C	D	E
Very important. E.g., changed the course of research project, provided key information needed to obtain a grant.					
Not very important. E.g., results were used as supplementary or back-up material.					
Unimportant. E.g., results had little or no effect on course of work.					

7. How would you rank the importance of the results of most of your searches?

Respondent	Very Important	Important	Not Very Important
A			
B			
C			
D			
E			

8. System Response Time:

	Respondents*				
	A	B	C	D	E
Approximately how long was it from the time you made your request until you had received the major group of relevant references?					
Was this adequate or did you really need the material sooner? (IF NEEDED SOONER, ASK HOW SOON)					
What was the maximum amount of time you could have waited for the major group of relevant references?					

*use values from the following table:

System Response
1 day or less
2 - 3 days
4 - 13 days
2 - 7 weeks
2 - 6 months
More than six months

9. Quality Control (relevancy of searches):

	Respondents*				
	A	B	C	D	E
Some irrelevant material is usually turned up in a search. What proportion of the total time you spent on this search would you guess was spent in culling out irrelevant or duplicate material?					
Was that about right or should you have had to spend less of your time culling out irrelevant or duplicate material? (IF LESS, ASK WHAT PROPORTION.)					
Of the time you spent on the search, what is the maximum proportion of your time you would have been willing to spend culling out irrelevant material?					

*use proportions from the following table:

Less than 1/4
1/4 but less than 1/2
1/2 but less than 3/4
3/4 or more

10. Timeliness:

Are the references identified during most of your searches considered timely enough for most of your purposes?

Respondent "A" _____

_____

Respondent "B" _____

_____

Respondent "C" _____

_____

Respondent "D" _____

_____

Respondent "E" _____

_____

11. Ease of Access:

Do you consider the information services provided at _____ _____ easy to use?

Respondent "A" _____

_____

Respondent "B" _____

_____

Respondent "C" _____

_____

Respondent "D" _____

_____

Respondent "E" _____

_____

D. General Assessments

1. Suppose you personally or your project had to pay for these services, would your usage be affected?

Respondent "A" _____

_____

Respondent "B" _____

_____

Respondent "C" _____

_____

Respondent "D" _____

_____

Respondent "E" _____

_____

2. Alternative Systems Assessment:

What other sources do you use for retrieving bibliographic information? Are these generally satisfactory?

	Respondents				
	A	B	C	D	E
Abstracting services					
Colleagues					
Professional journals					
Others (please describe)					

3. Effect on Traditional Library Services:

Has use of machine readable bibliographic services affected your use of the traditional library services:

Respondent "A" _____

_____

Respondent "B" _____

_____

Respondent "C" _____

_____

Respondent "D" _____

_____

Respondent "E" _____

_____

4. User Recommendations:

What changes would you like to make to the present services to improve their effectiveness?

Respondent "A" _____

_____

Respondent "B" _____

_____

Respondent "C" _____

_____

Respondent "D" _____

_____

Respondent "E" _____

_____

5. Impact on Research:

Has use of machine readable information services had any appreciable effect on the research in which you are engaged?

Respondent "A"

Respondent "B"

Respondent "C"

Respondent "D"

Respondent "E"

NASIC Bibliography

MARCH 1974

NEW ENGLAND BOARD OF HIGHER EDUCATION
WELLESLEY, MASSACHUSETTS

NASIC Bibliography

(1) ALTMANN, BERTHOLD. Comparison of HDL SDI Services Based on a Preliminary IEEE Tape and on DDC Tapes. U.S. Army Material Command, Harry Diamond Laboratories, Washington, D.C., 1970, 12 pp.

(2) AMERICAN INSTITUTE OF PHYSICS. Physics Information Division. SPIN: Searchable Physics Information Notices: technical specifications.

(3) ANDERLA, GEORGES. Information in 1985: A Forecasting Study of Information Needs and Resources. Organization for Economic Cooperation and Development, Paris, France, 1973, 132 pp.

(4) ARNETT, EDWARD M. A Chemical Information Center Experimental Station. A Final Report on National Science Foundation Grant GN-738. University of Pittsburgh, Pittsburgh, Pa., 1971, 227 pp. (NTIS PB 198 791).

(5) AUFENKAMP, D.D.; WEISS, E.C. "NSF Activities Related to a National Science Computer Network." In: International Conference on Computer Communication. 1st. Washington, D.C., October 24 - 26, 1972. Proceedings. Computer Communications: Impacts and Implications. Edited by Stanley Winkler. Association for Computing Machinery, New York, N.Y., 1972, 226-232.

(6) BARBER, A.S. et al. "On Line Information Retrieval as a Scientist's Tool." Information Storage and Retrieval, 9:8 (August 1973) 429-440.

(7) BATH UNIVERSITY OF TECHNOLOGY (ENGLAND) UNIVERSITY LIBRARY. Information Requirements of Researchers in the Social Sciences, Vol. 1. Text. Bath, England, 1971, 280 pp. (ED 054 806).

(8) BECKER, JOSEPH, ed. Proceedings of the Conference on Interlibrary Communications and Information Networks. American Library Association, Chicago, Ill., 1971, 348 pp.

(9) BLANC, ROBERT P. Review of Computer Networking Technology. U.S. National Bureau of Standards, Washington, D.C., 1974, 68 pp. (NBS Technical note 795).

(10) BLANC, ROBERT P.; COTTON, I.W.; PYKE, T.N.; WATKINS, S.W. Annotated Bibliography of the Literature on Resource Sharing Computer Networks. U.S. National Bureau of Standards, Washington, D.C., 1973, 92 pp. (NBS Special Publication 384).

(11) BORMAN, LORRAINE; MITTMAN, BENJAMIN. "Interactive Search of Bibliographic Data Bases in an Academic Environment." Journal of American Society for Information Science, 23:3 (May - June 1972) 164-171.

(12) BROWN, JACK E. The Canadian National Scientific and Technical Information System; a Progress Report. 1972 Miles Conrad Memorial Lecture. Presented at Annual Meeting of National Federation of Science Abstracting and Indexing Services, New York, N.Y., March 8, 1972. Report no. 4, May 1972.

(13) BUGINGS, SCOTT J.; CROW, NEIL B. The Computerized File Management - a Tool for the Reference Librarian. Paper prepared for presentation at the Special Libraries Association Conference, Boston, Mass., June 1972.

(14) BUNDY, MARY LEE, et al. The Administrator of a Special Library or Information Center and His Situation. Final Report. University of Maryland, College Park. School of Library and Information Services, 1970, 126 pp. (ED 054 799).

(15) CALIFORNIA, UNIVERSITY OF. LOS ANGELES. Mechanized Information Services in the University Library - Phase 1 - Planning; Vol. 2, Parts 9 - 13. University of California, Institute of Library Research, 1967.

(16) CALIFORNIA, UNIVERSITY OF. LOS ANGELES. CENTER FOR INFORMATION SERVICES. Continuation of a Proposal for Development of a Center for Information Services. Phase III.

(17) CAPITAL SYSTEMS GROUP. A Study of the Feasibility of Marketing Bibliographic and Census Data-Base Products and Services via the Northeast Academic Science Information Center. Submitted to New England Board of Higher Education, Wellesley, Mass., 1973.

(18) CARMON, JAMES L.; PARK, MARGARET K. "User Assessment of Computer-Based Bibliographic Retrieval Services." Journal of Chemical Documentation, 13:1 (1973) 24-27.

(19) CARROLL, KENNETH D. Survey of Scientific - Technical Tape Services. American Institute of Physics, New York, N.Y., 1970, 64 pp.

(20) COTTON, IRA W. Network Management Survey. U.S. National Bureau of Standards, Washington, D.C., 1974, 86 pp. (NBS Technical note 805).

(21) CROW, NEIL B.; ELCHESON, DENNIS R. "Monitoring and Retrieving Literature Searches Using a Generalized File Management System." In: American Society for Information Science. Annual meeting. 34th, Denver, Colo., November 7-11, 1971. Proceedings. Volume 8: 169-178.

(22) CUADRA, CARLOS A. "Computer Technology and Libraries of the Future." In: International Conference on Computer Communication. 1st, Washington, D.C., October 24-26, 1972. Proceedings. Computer Communications: Impacts and Implications, edited by Stanley Winkler. Association for Computing Machinery. New York, N.Y., 1972, 472-476.

(23) EDUCOM. INTERUNIVERSITY COMMUNICATIONS COUNCIL, INC. Spring Conference, Washington, D.C., April 13, 1972. Proceedings. Networks for Higher Education. EDUCOM, Princeton, N.J., 1972, 142 pp.

(24) EDUCOM. INTERUNIVERSITY COMMUNICATIONS COUNCIL, INC. Fall Conference, Ann Arbor, Mich., October 11, 12, 13, 1973. Proceedings. Networks and Disciplines. EDUCOM, Princeton, N.J., 1973, 209 pp.

(25) EDUCOM. INTERUNIVERSITY COMMUNICATIONS COUNCIL, INC. Spring Conference, Boston, Mass., April 6, 1973. Proceedings. Planning for National Networking. EDUCOM, Princeton, N.J., 1973, 136 pp.

26) FERGUSON, DOUGLAS. The Library, the Researcher and Computerized Information at Stanford University: a report to the Director of Libraries. Stanford University, Stanford, Calif., 1971, 23 pp. (ED 060 913).

27) FRIEDMAN, M. Information Retrieval Capabilities - National Environmental Research Center, Cincinnati, Library. U.S. Environmental Protection Agency, National Environmental Research Center, Cincinnati, Ohio, 1972, 76 pp. (NTIS PB 213 820).

28) FUGMANN, ROBERT. "On the Role of Subjectivity in Establishing, Using, Operating and Evaluating Information Retrieval Systems. Treatise II on Retrieval System Theory. Information Storage and Retrieval, Vol. 9:7 (July 1973) 353-372.

29) GECHMAN, MARVIN C. "Machine-Readable Bibliographic Data Bases. In: Annual Review of Information Science and Technology. Volume 7. Edited by Carlos A. Cuadra. American Society for Information Science, Washington, D.C., 1972, 323-378.

30) GEORGIA, UNIVERSITY OF. OFFICE OF COMPUTING ACTIVITIES. DIVISION OF INFORMATION SCIENCES. A Joint Proposal from the University of California, Los Angeles and the University of Georgia to Model the User Interface for a Multidisciplinary Bibliographic Information Network. Athens, Ga. 1973.

31) HAMPEL, VICTOR E; WADE, JOHN A. "Master Control - A Unifying Free-Form Data Storage and Data Retrieval System for Dissimilar Data Bases." In: American Society for Information Science. Annual Meeting. 32nd, San Francisco, Calif., Oct. 1-5, 1969. Proceedings. Volume 6, 159-174.

32) HERZOG, BERTRAM. Computer Networks. Merit Computer Network, Ann Arbor, Mich., 1972. (NTIS PB 213 978).

33) HILLMAN, D.J. "Customized User Services via Interactions with LEADERMART." Information Storage and Retrieval, 9:11 (November 1973) 587-596.

34) HOUSMAN, EDWARD. "Selective Dissemination of Information." In: Annual Review of Information Science and Technology. Volume 8. Edited by Carlos Cuadra. American Society for Information Science, Washington, D.C., 1973, 221-241.

35) ILLINOIS INSTITUTE OF TECHNOLOGY RESEARCH INSTITUTE. COMPUTER SEARCH CENTER. Educational and Commercial Utilization of a Chemical Information Center: four-year summary, June 25, 1968 to June 25, 1972. IITRI, Chicago, Ill., 1972.

36) INFORMATION DYNAMICS CORPORATION. Development Trends in Federal Library and Information Center Automation. Final report. IDC, Bethesda, Md., 1969, 429 pp.

37) KEHL, W.B. Center for Information Services. Final report phase II B. Detailed Design and Prototype Development. Jan 1, 1971 - June 30, 1972. University of California, Los Angeles, Center for Information Services, Los Angeles, Calif., 1972, 80 pp.

(38) KOWITZ, GERALD T. General Information Processing System: The GIPSY/ERIC Abstract Retrieval System. Oklahoma University, Norman, Okla., 1971, 89 pp. (ED 047 763).

(39) KRUZAS, ANTHONY. Encyclopedia of Information Systems and Services. 1st ed. Edward Brothers, Ann Arbor, Mich., 1971, 1110 pp.

(40) KUIPERS, J.W.; LANCASTER, F.W.; THORPE, R.W. Effectiveness and Cost-Effectiveness Considerations for NASIC Information Services Operation. QEI Incorporated, Bedford, Mass., 1973.

(41) LADENDORF, JANICE M. The Changing Role of the Special Librarian in Industry. Business and Government. Special Libraries Association, New York, N.Y., 1973.

(42) LINK, ALBERT D. A Comparison of Retrieval Efficacy from the ERIC Automated Information Retrieval System, Using Computer-Assisted-Instruction Training and Search Negotiations as Requester to System Interface Methods. New Mexico State University, La Cruces, N.M., 1972, 135 pp. (Ph.D Thesis. ED 067 215).

(43) LOCKHEED MISSILES AND SPACE COMPANY. Users Manual ERIC/DIALOG On-line Retrieval System. Palo Alto, Calif., 1972.

(44) LOS ANGELES REGIONAL TECHNICAL INFORMATION USERS COUNCIL. User Problems Associated with the Services of Federal and Quasi-Federal Technical Information Producing Agencies. Los Angeles, Calif., 1971, 73 pp. (ED 065 743).

(45) MARRON, BEATRICE; FONG, ELIZABETH; FIFE, DENNIS W.; RANKIN, KIRK. A Study of Six University-Based Information Systems. U.S. National Bureau of Standards, Washington, D.C., 1973, 98 pp. (NBS Technical note 781).

(46) NEUMANN, A.J. Network User Information Support. U.S. National Bureau of Standards, Washington, D.C., 1973, 20 pp. (NBS Technical note 802).

(47) NEUMANN, A.J. Review of Network Management Problems and Issues. U.S. National Bureau of Standards, Washington, D.C., 1973, 68 pp. (NBS Technical note 795).

(48) NEUMANN, A.J. User Procedures Standardization for Network Access. U.S. National Bureau of Standards, Washington, D.C., 1973, 36 pp. (NBS Technical note 799).

(49) NEW ENGLAND REGIONAL COMPUTING PROGRAM (NERComP). Expanded Research Program Relative to a National Computer Network: proposal to the National Science Foundation, July 1, 1973 - June 30, 1977, Cambridge, Mass., 1973.

(50) NORTH ATLANTIC TREATY ORGANISATION ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT. Scientific and Technical Information, Why, Which, Where and How. Lecture Series no. 44, presented Oslo (Norway) Nov. 2-3, 1970. 1971, 65 pp. (NTIS AD 721 730).

(51) NORTH CAROLINA SCIENCE AND TECHNOLOGY RESEARCH CENTER. Regional Technical Transfer Programs: Final Report. Period covered November 1, 1971 - October 31, 1972. Research Triangle Park, N. Car., 1973, 79 pp.

(52) O'DONOHUE, C.H. "Comparison of Service Centers and Document Data Bases - A User's View. Paper for presentation at American Chemical Society, Division of Chemical Literature. Evaluation of Existing Chemical Information Services Symposium, 63rd National Meeting, Boston, Mass., April 10, 1972, 9 pp. (Preprint).

(53) PARK, MARGARET. "Computer-Based Bibliographic Retrieval Services: the View from the Center." (Computer Center, University of Georgia). Special Libraries, 64:4 (April 1973) 187-192.

(54) PATRINOSTRO, FRANK; MULHERIN, NATHAN. Available Data Banks for Library and Information Services. Edited by Patricia Ryan. LARC Association, Tempe, Ariz., 1973, 42 pp.

(55) PITTSBURGH, UNIVERSITY OF. Campus-Based Information System. Annual Reports. I Feb 1, 1971 - Jan. 31, 1972. II Feb. 1, 1972 - Jan. 31, 1973, to National Science Foundation. Grant no. G-27537. Principal Investigator Allen Kent.

(56) PRICE, DOUGLAS S. Collecting and Reporting Real Costs of Information Systems. American Society for Information Science, Washington, D.C., 1971, 160 pp. (ED 055 592).

(57) RESEARCH CENTERS DIRECTORY. 4th ed. 1972. Gale Research Co., Detroit, Michigan, 1034 pp. NEW RESEARCH CENTERS: a periodic supplement to Research Centers Directory: no. 1 - ; 1972 - ; Gale Research Co., Detroit, Mich.

(58) SCHIPMA, PETER. Provision of SDI Services. IIT Research Institute, Computer Search Center, Information Sciences, Chicago, Ill., n.d.

(59) SCIENCE COUNCIL OF CANADA. A Policy for Scientific and Technical Information Dissemination. Ottowa, Canada, 1969.

(60) STANFORD RESEARCH INSTITUTE. Requirements, Criteria and Measures of Performance of Information Storage and Retrieval Systems. Menlo Park, Calif., 1961.

(61) STANFORD UNIVERSITY DATA FILE DIRECTORY. Stanford, Calif., 1973.

(62) STILLMAN, RONA B. Computer Networking: Approaches to Quality Service Assurance. U.S. National Bureau of Standards, Washington, D.C., 1974, 20 pp. (NBS Technical note 800).

(63) VEAZIE, WALTER H.; CONNOLLY, THOMAS F. The Marketing of Information Analysis Center Products and Services. ERIC Clearinghouse on Library and Information Sciences and ASIS Special Interest Group on Information Analysis Centers (SIG/IAC), American Society for Information Science, Washington, D.C., 1971, 28 pp.

(64) WAYNE STATE UNIVERSITY. LIBRARIES. Access to Machine Readable Bibliographic Data. A Proposal to MERIT. Detroit, Mich., Aug. 1972, 16 pp. (ED 066 200).

(65) WILLIAMS, MARTHA. Handling of Varied Data Bases in an Information Environment. Illinois Institute of Technology Research Institute, Chicago, Ill., 1971, 24 pp. (ED 067 143).

(66) WILLIAMS, MARTHA; SCHIPMA, PETER. "Design and Operation of a Computer Search Center for Chemical Information." Journal of Chemical Documentation, 10:3 (August 1970) 158-162.

(67) THE WILLIAMS AND WILKINS COMPANY v. THE UNITED STATES. In the United States Court of Claims, no. 73-68, (filed Feb. 16, 1972). Report of the Commissioner to the Court.

NASIC -- A Regional Experiment in the Brokerage of Information Services

DAVID M. WAX AND R. D. MORRISON, JR.

OCTOBER 1973

NEW ENGLAND BOARD OF HIGHER EDUCATION
WELLESLEY, MASSACHUSETTS

NASIC -- A REGIONAL EXPERIMENT IN THE BROKERAGE OF INFORMATION SERVICES *

David M. Wax and R. D. Morrison, Jr.
New England Board of Higher Education

The Northeast Academic Science Information Center (NASIC), a program of the New England Board of Higher Education, represents an attempt to apply on a regional basis the concept of brokerage or wholesaling to the provision of computer-based information services. Through intense promotion and active marketing of services and through training of Information Service Librarians on the campuses of the major academic institutions, NASIC aims to create, tap and serve the substantial market of researchers in the Northeast who are in need of continuous and comprehensive information. Through aggregation of user demand and negotiation of bulk purchase contracts with multiple suppliers, NASIC intends to serve the research community of the Northeast at a reasonable cost while assuring its own continued viability as a self-supporting organization. Finally, through utilization of available computing capacity in the Northeast and an existing communications network in the region, NASIC ultimately aims to become an efficient, self-supporting supplier of low-cost services particularly appropriate to

---

*Presented at the Ninth Annual Council Meeting and Conference of EDUCOM at Princeton, New Jersey, October 10, 1973.

the needs of the region's research community. These goals and the efficiencies and economies that they imply are the basis for the decision by the office of Science Information Service of the National Science Foundation to underwrite the development of NASIC, and for the support and enthusiasm for this cooperative effort by many of the principal universities of the Northeast.

The Functions of NASIC

In more specific terms, NASIC will direct its efforts toward the fulfillment of eight basic functions:

1. Market survey and analysis
2. Promotion and marketing of computer-based information services
3. Training of library personnel
4. Aggregation of demand from multiple users
5. Negotiation of contracts with suppliers at discount rates
6. Development of document delivery capability
7. Supplying information services directly
8. Development of an efficient delivery system based on existing resources within the region

Each of these functions is directly tied to the viability of NASIC as an organization and the brokerage concept as an effective means of providing information services.

The activity involving the determination and evaluation of the market for computer-based information services underscores the basic principle underlying the NASIC approach to the provision of information services. NASIC is devoting

a significant amount of its efforts and resources to an assessment of the specific information needs of the research community of the Northeast. To determine the nature and extent of the market, NASIC will utilize many of the techniques common to product introduction in the industrial and commercial environment -- but definitely not typical of the academic environment. This analysis will enable NASIC to ascertain demand for particular information services and will allow the setting of prices necessary to assure NASIC's self-support.

In addition to the determination of the existing and potential market for computer-based information services, NASIC will attempt to create new users through an active campaign of advertising and promotion. Various methods and media -- campus newspapers, bulletin boards and department meetings, to name just a few -- will be utilized and evaluated for broadcast effectiveness and cost effectiveness. Recognizing that word-of-mouth is probably the least expensive and most effective means of publicizing the utility of information services, NASIC will concentrate on developing a cadre of satisfied users on every campus.

An important aspect of the NASIC concept is that computer-based information services constitute a logical extension of the information services and products traditionally provided by the college and university library. Within the library of each major research institution in the region, one or more staff members will be trained to function as Information Service Librarians (ISL's). With the understanding of the principles underlying the search techniques for data bases,

with awareness of the content of the broad range of available data bases, and with the skills to develop and code effective search profiles, the ISL's will function as the interface between the supplier and users of information services so that the user can obtain fullest utility from existing information resources.

It will be the function of the ISL first to assist the researcher in the definition of his specific information requirement. Second, the ISL will have the responsibility to select the most appropriate source for the information required by the user. This decision involves not only the determination of appropriate data bases, but also an awareness of the search algorithms employed at the various information centers processing that data base to guarantee the most effective fulfillment of the particular requirements of the individual researcher. Third, the ISL will undertake the development of a search profile that will yield the greatest recall of citations and abstracts needed by the user while minimizing irrelevant and unnecessary references. Fourth, the ISL will be involved in the review of search output for relevance and completeness judgements. This review will also serve as the basis for determination of the desirability for the modification of the search profile in the case of continuing current awareness services. Finally, the ISL or a colleague in the library staff will assist in arrangements for document delivery related to the search output.

While the traditional role of the library is thus not modified by the introduction of computer-based information

services -- a computer printed list of bibliographic citations and abstracts is not significantly different from a typed list -- the manner and means by which services are provided by the library to the user will be changed. For this reason, an important component of the NASIC program will be the orientation of the academic library community to the utility of computer-based information services and the training of library personnel to enable them to acquire the knowledge and skills necessary to function as effective Information Service Librarians.

Another important aspect of NASIC's brokerage role will be the aggregation of demand from a multiplicity of users dispersed over a large geographic region. The economies of scale in the provision of such services are substantial, and only through aggregation of demand can the real costs of these services be kept at reasonable -- and marketable -- rates. The true costs of providing these services on a single campus, particularly in small or medium-sized universities, are very high, in most cases prohibitive. Through regional aggregation of demand, the cost components -- including hardware, data bases, technical staff input, and administrative and management resources -- can be prorated over a large number of searchers, with the add on to any individual search kept relatively low.

Further economies of scale and competition can be generated through the negotiation of contracts with a range of suppliers at discount rates. Because of the existence of competitive suppliers for many of the relevant services

and because most of these suppliers have capacity to provide significantly greater quantities of services at only marginal increases in real costs, the discounts resulting from aggregation of demand should in many cases be sufficient to cover the entirety of the NASIC overhead costs. Finally, NASIC's activities as a broker and aggregator of demand will enable NASIC to provide the research community of the Northeast with a much greater variety of services than would otherwise be available.

The basic assumption underlying this brokerage experiment is that it is inconceivable that a large number of universities in the Northeast would be willing to underwrite on their own the provision of a broad range of computer-based information services. It is even less likely that any of the small or medium-sized institutions would be able to offer even minimal services. And if one or more institutions did make such marginal services available, it would be impossible for them to provide the great variety that NASIC as a broker and aggregator of demand could offer to all of the researchers throughout the entire region.

The provision of bibliographic and abstract services at a reasonable cost, while in itself a worthy goal, does not constitute the sole objective of NASIC. The user often requires services beyond a listing of citations and a collection of abstracts; in many cases, document delivery is an essential component of total service to the user. Through its close ties to the academic libraries of the region, NASIC will work toward the development of systems for

delivery of the necessary hard copy to the user, whether it take the form of reprints, photocopies, microfiche or monographs. NASIC's link to the computer-based library support system of the New England Library Information Network (NELINET) and the ultimate utilization of that system for serials control, interlibrary loan and even perhaps circulation control, will play a significant role in the development of a viable hard copy delivery capability.

NASIC also recognizes that there is a broad range of potential information services that are not now available anywhere, and it is likely that NASIC will become a direct supplier of such services should a market for them exist. Activities in this area would include the development by the New England Board of Higher Education of data bases that would have national or particular regional utility. Such efforts might also include the initiation of a newsletter or adoption of other means of communication to keep the research community of the Northeast current on new developments related to information in their fields of interest.

Finally, NASIC sees as one of its primary functions the utilization of existing resources within the region as a basis for efficient delivery of information services. Reference has already been made to potential use of the NELINET system to assist in an economical document delivery capability. It is also planned that use will be made of the existing general computation computer network of the New England Regional Computing Program (NERComP) as a communications network for at least part of the delivery

process for computer-based information services. Should the utilization of the NERComP network prove effective, it is possible that the network might efficiently expand to include the entire Northeast region. Furthermore, if demand for information from one or more data bases warrants it, NASIC could begin to "spin tapes" on its own, utilizing existing hardware and technical resources within the region to do the processing and the NERComP network as a delivery system. Finally, as NASIC moves into an operational mode, it is likely that we will discover or modify other existing resources to add to the efficiency of the delivery system for computer-based information services.

NASIC: The User's Perspective

The primary goal of NASIC is to provide valuable information services to the bench level researcher in the Northeast. From the point of view of this user, NASIC must provide fast and economical access to a body of information that is of use to him. Thus, to meet its objectives NASIC must be able to provide information from a broad range of data bases, must be able to deliver information products that are timely, complete and relevant, and must be able to do this at a price that will make the purchase of this service desirable.

It is the operating plan of NASIC that the user perceive these computer-based information services as the logical extension of the information services presently provided by the university library. When he is in need of information,

the user will arrange to discuss his particular requirements with the Information Services Librarian (ISL) resident at his own institution. Should the specific subject area be outside the range of competence of the local ISL(s) or should the user be located at an institution too small to employ a trained ISL, the user can be directed to an information specialist at the NASIC offices or to an ISL at another university in the region who happens to have special competence and knowledge in the specific discipline in question.

The ISL, after discussing the research problem with the user, will utilize the knowledge he has acquired about the various data bases and search techniques available to determine the most appropriate means of providing the necessary services. A search profile will be developed and coded by the ISL and the search ordered under the auspices of NASIC. The mode (on line or off line) to be used in developing the profile and ordering the search will depend on a number of factors including the availability of processing alternatives, the time requirements of the user, and the price the user is willing to pay. Within a period of time ranging from a few minutes to a week or more, the output will arrive at the desk of the ISL, who will review it with the user for relevance and completeness. At the same time, the user will be informed as to the options for obtaining hard copy of those articles that are of particular value.

In most cases the user will pay for these services by charging them to his personal or grant account at the university. In some instances, departments might allocate

funds for acquiring these services in their budgets, as support to the research of department members. In other situations, the college or university might choose to make these services available to all faculty members and students either free or on a token charge basis, with the service subsidy coming out of general library or academic budgets. But in all cases the user will appreciate that he is receiving a valuable service which has a real cost attached to it. And, the user will also be aware of the fact that the availability of this kind of information service was the result of a cooperative effort of his own institution and similar institutions operating under the auspices and guidance of NASIC.

Conclusion

NASIC reflects the intent of the New England Board of Higher Education, with the encouragement and financial assistance of the National Science Foundation, to provide a large research community with economical and effective access to a broad range of information services. By utilizing existing human and machine resources, both within and outside the Northeast region, NASIC hopes to demonstrate that these services can be made available without paying for the redundance of reinvention. While implementation of an effective brokerage operation is essential to the long range success of this experiment, of far greater importance is the demonstrated willingness of the region's institutions of higher education to recognize the need for cooperation for

mutual benefit and to work diligently to achieve that cooperation.

With a valuable product, effective management and continuing interinstitutional cooperation, NASIC will be able to demonstrate that the brokerage concept can be applied to the provision of information services.

SOME COMMENTS ON

THE PRESENT AND FUTURE

ROLE OF NASIC

by

Alan M. Rees,
Associate Dean
School of Library Science
Case Western Reserve University
Cleveland, Ohio
44106

November 5, 1973

OBITER DICTA

"The advent of machine-readable data bases is one of the most significant forward steps in information retrieval" (Gechman, 1972).

"During the past few years there have been an increasing number of tape services entering the information resources market. Each of these services makes available to a library or information center, on a continuing basis, computer-readable data which can be utilized in as many diverse services as the center's programs and clientele require" (AIP-ASIS Survey, 1970).

"If the current trend continues, libraries will cease to relinquish to computer centers the responsibility of providing information services from machine readable data bases (including both bibliographic and digital data tapes). These services should become, and are becoming, natural extensions of the other graphic and hardcopy services most libraries now provide. Some librarians have resented large bibliographic data bases because of this potential for by-passing the library; however, progressive librarians are now making machine-readable data bases a vital part of the library's program" (Gechman, 1972).

"The past ten years have seen the development of a new method of transferring information from the producer to the user. A new type of intermediary has become established beside the traditional library. This new intermediary is the information dissemination center (IDC) which subscribes to several machine-readable data bases and then services the individual user directly. IDC's are being called the information "retailers" or information middlemen of the 1970's" (Kennan, 1973).

"In spite of the constraints, it now appears highly probable that major growth in on-line information services can be expected, growth comparable to that of timesharing computing services in the late 1960's. This growth, however, depends on networking.... It will no longer be necessary or even desirable for one computer center to process many data bases for its local users, with the attendant high storage and operating costs, as has been the pattern in some university computer centers. Even providing rapid service on one good file will strain the capabilities of some large computer centers. Networking would allow specialization in other services such as economic modeling and linguistic processing" (McCarn and Leiter, 1973).

I. INTRODUCTION

The proliferation of machine-readable, bibliographic files has resulted in the development of a data base industry replete with producers, wholesalers, retailers, brokers and consumers. In the information marketplace, consumers are free to deploy a number of options involving either on-line or batch processing on the part of wholesalers or retailers. Most data base usage is currently concentrated in industrial organizations and mission-oriented government agencies.
Despite the existence of information service centers (data base retailers) on university campuses, most of the usage is external to the academic environment. The only exception is MEDLINE, which is presently being used by more than 120 institutions with more than 200 terminals primarily located in university medical centers. Even with extensive promotional and educational activity, machine-readable data bases are under-utilized. This stems both from lack of awareness on the part of the academic community and from difficulty in obtaining access.

II. MAJOR OBJECTIVES OF NASIC

Within this general context, the New England Board of Higher Education is developing and implementing a Northeast Academic Science Information Center(NASIC). This will support the information needs of academic researchers by establishing an administrative, technical and coordinating organization to ensure more effective utilization of information processing centers and existing science information resources in the United States.

Parallel objectives are to establish a computerized text and information processing system for academic institutions and to extend and amplify the role of the library as an intermediary between machine-readable information services and users in the academic environment.

It is intended that NASIC will serve as an interface between individuals in the science community who have information needs and the sources, data bases and services which can best serve those needs. The prime responsibility is vis-à-vis the academic science community with subsidiary interest in servicing industrial and governmental organizations. User demands will be aggregated to the point at which unit costs can be reduced by the negotiation of bulk purchase contracts with multiple suppliers. Emphasis is placed upon the brokerage of existing information products and services. The Program Management Plan expresses this point cogently:

> NASIC therefore is heavily concerned with organization, management and promotion of existing information services. NASIC has no present interest in development of new retrieval systems, new software or new data bases. NASIC is concerned with creating market aggregation and service aggregation as a principal means of achieving economic viability in the market place.

The university library is viewed as being the access point for NASIC services in that computer-based information services constitute a logical extension of the information services and products traditionally provided by the university library. Information service librarians

will be trained to act as intermediaries between users and data bases and will assist the user in formulation of his question, selection of appropriate data bases, construction of search strategies and screening of output.

III. PRESENT ACTIVITY

A number of problems are being faced by NASIC management: selection of data bases; modes of access and interfacing arrangements; optimum performance levels; network design; and appropriate software. A recent report of QEI Inc. explores "Effectiveness and Cost Effectiveness Considerations for NASIC Service Operations" and attempts to establish guidelines for the design and operation of NASIC services. A number of options are identified and compared. The report concludes that, "in the case of some data bases, the choice may be one between the purchase of services directly from the producer (wholesaler) and the purchase of services from a middleman (retailer); some may involve a choice between the licensing of the data base or the purchase of service from the supplier of the data base; some may merely involve a choice between different middlemen (retailers)." Both on-line and off-line modes of access will be made available as appropriate.

A pilot NASIC information service is presently being established at MIT. This effort will assist in determination of the market, education of users and advertising of available services, training of information service librarians and testing of operating procedures.

The pilot system will be constructed as a realistic model of the planned operational system in terms of data base services, costs, computer routines, accessibility and interfacing arrangements. The MIT activity is being supplemented by a market analysis currently being carried out by Capital Systems Group aimed at defining the characteristics of the potential market segments---academic, non-profit, governmental and industrial/commercial.

IV. THE FUTURE OF NASIC

As the general mode of operation of NASIC is beginning to emerge it would be easy to focus attention exclusively on the techniques and technology required to accomplish the given ends and to patch objectives in terms of appropriate modification as time elapses. However, this temptation should be avoided since the information retrieval field is littered with the wreckage of systems launched with high hopes and fuzzy objectives. Before NASIC makes a positive and irreversible commitment to the various systems and configurations proposed it would be wise to examine more closely the identified objectives. The specification, design and delivery of information services and products are obviously dependent upon the characteristics of the user groups, the types of information needs, the viability of the market and other factors. These major factors are far from clear at this present time.

1. Nature of the Market:

The principal thrust is directed towards the utilization of machine-readable information resources by the academic, science research community. Yet little attention has been paid to the explication of the

information needs of this community. The conception of the academic marketplace for information services is strongly influenced by the industrial orientation of the contractors such as QEI and the Capital Systems Group. Although located on university campuses, much of the experience at information service centers such as at the University of Georgia, has been in relation to the servicing of local and regional, industrial customers. More attention must be paid to the peculiar characteristics of the academic environment.

The conceptual framework outlined in the Program Management Plan identifies three major academic user groups: grant-supported and institution-supported researchers in science and engineering; faculty members in these areas; and candidates for advanced degrees. It is clear that most faculty members with grant support are members of an élite group and have excellent access to informal communication channels. Moreover, the amount of sponsored research in the university setting has diminished dramatically and is not likely to revive to previous peak levels in the foreseeable future. Paradoxically, those persons with the most urgent information needs---doctoral candidates---are least able to afford information services. The market analysis presently being conducted by the Capital Systems Group will doubtless confirm these facts.

Even if an appropriate funding mechanism were to be found to support access to data bases by doctoral candidates and if researchers were to charge information services against grants and contracts, it is questionable whether this type of usage alone constitutes a viable

market for NASIC. Since education as opposed to research is now being considered, somewhat belatedly, as the principal mission of the university, the utility of machine-readable data bases as a support to the educational process should be examined.

It may, therefore, be worthwhile to consider the potential usage of data bases in relation to the educational in addition to the research process within the university or college setting. The interface between the academic curriculum and the resources of the data bases needs further explication. It is not difficult to conceive of data bases as being an important resource in the construction of learning materials and in the support of the academic program. Profiles for curricula and/or courses may be constructed and searched against appropriate data bases. Students in metallurgical engineering could receive bibliographies depicting the significant aspects of their field. More specifically, students studying in a course such as Electrical and Magnetic Properties of Ceramics could receive a bibliography based upon the profile of the course, supplemented by citations supplied by the instructors and matched against the resources of the library.

Alternatively, students in engineering courses may be required to prepare their own bibliographies by accessing COMPENDEX and other data bases through terminals located on campus. Such experience would assist them in problem definition and solution in their field and would provide insight into the structure of the literature.*

---

*Medical students at George Washington University are being taught to use MEDLINE by means of a CAI program called MEDLEARN.

This type of usage would apply the resources of available data bases to the educational process and would have a more widespread impact on the campus than would usage by a few researchers. The funding mechanism should be obvious. Since the usage suggested is in support of the instructional program, it would be entirely appropriate to charge the expenses against the department or school concerned. It is quite possible that the student would be required to pay a laboratory fee to cover the costs. In the same manner that computer time is made available by the university for instructional purposes, so would time on the terminal be provided to access data bases if the educational benefits are demonstrable.

2. Information Services and Products:

Exclusive attention is being paid to the provision of retrospective and current awareness services. While these services are basic, consideration should be given to a number of other possibilities, in that provision of addresses of information may not be sufficient. Some of the supplementary products and services can be identified:

(i) Document delivery -- for those items identified in search output as being relevant and valuable.

(ii) Screening of output -- evaluation of output performed by subject specialists employed by the library for the purpose of determining the relevancy and/or usefulness (value) of items identified.

(iii) Information analysis -- critical compacting of the literature and the production of state-of-the-art reviews.

(iv) Data services -- retrieval and formatting of data.

(v) Referral service -- access supplied to the Smithsonian Science Information Exchange.

(vi) Learning materials -- packages of materials in the form of photocopies of key articles could be compiled in relation to specific courses and other identified needs of groups of users on campus.

No specific answers to these options can be supplied at the present time. Hopefully, the market analysis presently being conducted and the pilot testing at MIT should shed light on the desirability and feasibility of these alternatives.

3. Academic Versus Extra-Academic Responsibility:

An ambivalence appears to exist in relation to the role of NASIC in servicing organizations external to the university/college setting. Although the major interest is directed towards usage within the university ambiance, attention is also being given to industrial organizations, non-profit institutions and governmental agencies. The market analysis will explore all four markets. However, it may be argued that the markets are quite different and separate products and services may have to be devised for each market segment. Advertising, promotion and access may have to be designed differentially in relation to each segment.

4. Research and Development:

While NASIC must undertake a certain amount of research and development in order to take into account changing technology, prime emphasis

should be placed on the application of present state-of-the-art methods, equipment and procedures. It is vital that NASIC establish a viable, operational system in the very near future and an extensive commitment to research and development would hamstring the implementation of operational services. The experience of INTREX is very relevant in this connection. The essential concern is not to conduct research but rather to devise the optimum means to exploit and apply existing technology to solve specific problems.

5. Mode of Operation:

Considerable attention has been paid to the mode of operation involving off-line access, on-line access, in-house manipulation of tapes versus purchasing of services from producers or retailers of tapes and so on. Criteria need to be established for management decision making in relation to the selection of data bases and the acquisition of data bases or data base services. The QEI Report is a valuable contribution in this connection, but more refinement is necessary if the guidelines sketched are to be useful in actual networking practice.

V. RECOMMENDATIONS:

1. Attention should be paid immediately to the definition of the market since the needs of the major user groups are fundamental to future planning and development. The market analysis should yield valuable data in this connection. The MIT pilot test also has the potential of providing significant insight. The MIT group should be directed towards a classification or structuring of the academic environment

by variables such as project, department, school, subject area, level of user etc. Specific data bases and types of services should be aimed at defined catagories of users and evaluated accordingly, so that conclusions can be drawn as to the optimum configuration of services for perhaps doctoral candidates in the Department of Chemistry.

Moreover, the MIT effort should not adopt a "shot-gun" approach and service whomsoever appears with money. Instead, it is necessary to discover potential demand (ie. need) in addition to actual demand in the form of paying customers. Experimental service should be provided to those unable to pay and mechanisms explored to provide the necessary funds if these services are judged to be valuable. If the outcome of the MIT project is to be a model capable of generalized application regionally, it is essential that all factors be taken into account and tested accordingly. Conclusions should be drawn in relation to defined populations in the total academic environment.

2. A greater variety of information services and products should be considered. This might involve document delivery, initial evaluation of output, information analysis, creation of instructional materials, referral service and so on.

3. More attention should be paid to the educational as well as the research orientation of the university or college. This would permit a broadening of the market for tape services and a more widespread impact on the total academic community.

4. The markets external to the academic environment should be considered separately and differentially.

5. Emphasis should be placed upon application of existing state-of-the-art. It is not necessary to re-invent the wheel, nor is it required to pioneer in the creation of new technology. Extensive use can be made of existing knowledge. For example, Parker and Martin at Stanford University have produced a series of videotapes which portray the searching and display capabilities of such on-line search systems as LEADER, BASIS-70 and RECON. These videotapes will be most useful in the training of information service librarians. Parker and Martin are also working on a thirty-minute movie which will be an understandable and reasonably complete introduction to interactive information retrieval for potential searchers.

6. NASIC should be a "network of networks" in that the emphasis should be on linkages for the purpose of access rather than on processing. It should be a center that accesses existing processing centers. In this connection, the dictionary definition of "broker" is entirely appropriate: "a go-between in affairs of love or sex; an agent middleman who for a fee and commission negotiates contracts of purchase and sale between buyers and sellers without himself taking title to that which is the subject of negotiation and usually without having physical possession of it." NASIC will arrange for, and expedite, transactions between consumers and the most appropriate data base suppliers at either the wholesale or retail level.